

1 IN THE UNITED STATES DISTRICT COURT
2 FOR THE NORTHERN DISTRICT OF OHIO
3 EASTERN DIVISION
4 - - -

5 IN RE: NATIONAL : HON. DAN A.
6 PRESCRIPTION OPIATE : POLSTER
7 LITIGATION :

8 This document relates to: : NO.
9 : 1:17-MD-2804

10 County of Cuyahoga, et :
11 al. v. Purdue Pharma L.P., :
12 et al., Case No. 17-OP- :
13 45004 (N.D. Ohio) :

14 County of Summit, Ohio et :
15 al. v. Purdue Pharma L.P., :
16 et al., Case No. 18-OP- :
17 45090 (N.D. Ohio) :

18 - - -

19 - HIGHLY CONFIDENTIAL -

20 SUBJECT TO FURTHER CONFIDENTIALITY REVIEW

21 April 25, 2019

22 Videotaped deposition of
23 JONATHAN GRUBER, Ph.D., taken pursuant to
24 notice, was held at the law offices of
25 Robins Kaplan, 800 Boylston Street,
26 Boston, Massachusetts, beginning at 10:06
27 a.m., on the above date, before Michelle
28 L. Gray, a Registered Professional
29 Reporter, Certified Shorthand Reporter,
30 Certified Realtime Reporter, and Notary
31 Public.

32 - - -

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(Via stream)

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VIDEO TECHNICIAN:

23 Robert Martignetti

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- - -
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None.

Request for Production of Documents

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None.

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None.

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None.

1 THE VIDEOGRAPHER: We are
2 now on the record. My name is
3 Robert Martignetti. I'm a
4 videographer for Golkow Litigation
5 Services.

6 Today's date is April 25,
7 2019, and the time is 10:06 a.m.

8 This video deposition is
9 being held in Boston,
10 Massachusetts, In Re National
11 Prescription Opiate Litigation.

12 The deponent is Jonathan
13 Gruber.

14 Counsel in the room, please
15 identify yourselves.

16 MR. GEISE: Steve Geise on
17 behalf of Walmart.

18 MS. CASTLES: Claire Castles
19 on behalf of Walmart.

20 MR. HALLER: David Haller
21 and Megan Hare from Covington &
22 Burling for McKesson.

23 MR. HALPERN: Richard
24 Halpern for HBC Services, Inc.

1 MR. ROTH: Martin Roth for
2 Allergan Finance, LLC.

3 MR. BREWER. Matt Brewer,
4 Bartlit Beck for Walgreens.

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7 Purdue defendants.

8 MR. KAISER: Matthew Kaiser
9 for the Janssen defendants.

10 MR. MOYLAN: Daniel Moylan
11 from Zuckerman Spaeder for the CVS
12 defendants.

13 MS. ROLLINS: Anne Rollins,
14 Reed Smith, for AmerisourceBergen
15 Corporation.

16 MS. PANTINA: Jennifer
17 Patina, from Ropes & Gray for
18 Mallinckrodt, LLC and Spec GX.

19 MS. RUMSEY: Allison Rumsey,
20 from Arnold & Porter for Endo and
21 Par.

22 MR. CIACCIO: Joseph Ciaccio
23 from Napoli Shkolnik for Cuyahoga
24 County.

1 MS. SUTTON: Tara Sutton,
2 Robins Kaplan on behalf of
3 Plaintiffs.

4 MR. KO: David Ko, Keller
5 Rohrbach, on behalf of the
6 plaintiffs, and also on behalf of
7 the witness.

8 THE VIDEOGRAPHER: The court
9 reporter is Michelle Gray and will
10 now swear in the witness.

11 - - -

12 ... JONATHAN GRUBER, Ph.D.,
13 having been first duly sworn, was
14 examined and testified as follows:

15 - - -

16 EXAMINATION

17 - - -

18 BY MR. GEISE:

19 Q. Good morning, sir.

20 A. Good morning.

21 Q. I had a chance to introduce
22 myself before we went on the record. My
23 name is Steve Geise. I'm an attorney
24 representing Walmart in this case. And

1 I'm going to start off today by asking
2 you a series of questions. Is that okay?

3 A. Sure.

4 Q. Now, your name is Jonathan
5 Gruber. Do you have what you prefer to
6 be called, Professor Gruber, Mr. Gruber,
7 what's your preference?

8 A. I don't care. Whatever is
9 easier for you.

10 Q. Okay. I'll stick with
11 professor. How's that?

12 A. Sounds good.

13 Q. You do understand that
14 you're appearing here today to give
15 testimony for the plaintiffs, Cuyahoga
16 County and Summit County, in this
17 litigation, correct?

18 A. Yes, I do.

19 Q. You understand that you're
20 testifying under oath?

21 A. Yes, I do.

22 Q. You understand that your
23 testimony here today will have the same
24 effect and import as if you were

1 testifying in front of a judge and jury
2 in a courtroom, correct?

3 A. Yes.

4 Q. I know you've given a
5 handful of depositions in your career; is
6 that correct?

7 A. Yes.

8 Q. Go over a couple quick
9 ground rules. One thing to make it
10 easier for Michelle today, if I could ask
11 you to wait until I complete a question,
12 even if you know where my question is
13 going before you answer. It will make it
14 easier on her. Is that okay?

15 A. Yes.

16 Q. Similarly, I will try to
17 wait until you finish an answer before I
18 ask another question. Okay?

19 A. Yes.

20 Q. Throughout the day there may
21 be questions that I ask that draw an
22 objection from the plaintiffs' attorneys.
23 If that happens, we will deal with that.
24 But most of the time that's just to

1 preserve some legal argument. Unless
2 you're instructed to answer, do you
3 understand you'll still answer the
4 question?

5 A. Yes.

6 Q. If any questions I ask today
7 are unclear or you don't understand the
8 terminology that I use, would you please
9 let me know, and I can rephrase the
10 question?

11 A. Sure.

12 Q. If you don't ask me to do
13 that, I will assume that you've
14 understood the question I've asked and
15 answered that question. Is that fair?

16 A. Yes.

17 Q. We'll be at this for quite a
18 few hours today, but it's not an
19 endurance session. If you need to take a
20 break at any time, please ask me, and I'm
21 sure we can accommodate that.

22 A. Okay.

23 Q. Are there any reasons why
24 you're not able to give full, fair and

1 complete testimony today about the
2 opinions you formed in this case?

3 A. No.

4 Q. Professor Gruber, I'll hand
5 you what's marked as Exhibit 1 to your
6 deposition, which is a copy of your
7 expert report, including the appendices.

8 (Document marked for
9 identification as Exhibit
10 Gruber-1.)

11 BY MR. GEISE:

12 Q. Do you see that?

13 A. Yes, I do.

14 Q. Professor Gruber, did you
15 write this report on your own?

16 A. I wrote the report -- I --
17 all the words are mine. I wrote the
18 report. I was assisted in creating the
19 report by a number of parties. But the
20 report is my words and my responsibility.

21 Q. Can you identify the parties
22 who assisted you in writing your report?

23 A. Sure. I received support
24 for the analysis from Compass Lexecon, a

1 litigation consulting firm.

2 I received comments on the
3 draft from both the lawyers I worked with
4 and from some of my fellow experts.

5 Q. And I don't want to ask you
6 about the comments you may have received
7 from the lawyers at this point, but I do
8 want to ask you, who are the individuals
9 at Compass Lexecon who assisted you in
10 preparing your report?

11 A. I don't know everyone who
12 assisted. I know the people I dealt with
13 most consistently in my report were Hal
14 Sider and Evan McKay.

15 Q. In addition to Hal Sider and
16 Evan McKay, is it your understanding that
17 there were other individuals at Compass
18 Lexecon who provided assistance for your
19 materials for your report?

20 A. I'm not certain.

21 Q. You said that you weren't
22 sure of everybody at Compass Lexecon who
23 assisted. Is it your understanding that
24 there are other individuals in addition

1 to Mr. Sider and Mr. McKay who did
2 assist?

3 A. It's my understanding there
4 were other individuals who were working
5 on this general matter for the
6 plaintiffs. I don't know for sure who
7 assisted with my report in particular.

8 Q. You also identified that you
9 discussed your report with a number of
10 fellow experts in the case; is that
11 correct?

12 A. That is correct.

13 Q. Can you identify the other
14 experts with whom you spoke about your
15 report?

16 A. With David Cutler and Tom
17 McGuire.

18 Q. Did you speak with any other
19 experts for purposes of preparing your
20 report?

21 A. No.

22 Q. Can you describe the
23 involvement that experts Cutler and
24 McGuire had on your preparation of your

1 report?

2 A. We -- they read it,
3 commented on it. We had a number of
4 conversations about the structure of the
5 report and how it fit into the whole set
6 of reports that are being produced.

7 Q. Throughout your report, you
8 identify and refer to reports by Cutler,
9 McGuire and other experts. Did you have
10 their reports with you at the time you
11 were preparing your report?

12 A. I saw drafts of their -- the
13 drafts were being prepared
14 simultaneously. So, yes, I saw drafts of
15 their reports.

16 Q. Did you have any joint
17 meetings with Cutler and McGuire, where
18 the three of you would talk about what
19 you were going to cover in your
20 individual reports?

21 MR. KO: At this point, I
22 just instruct the witness to make
23 sure that, to the extent that any
24 of these meetings happened with

1 counsel, not to disclose any of
2 the contents or the substance of
3 the conversations, but certainly
4 you're free to respond as to the
5 topic and the identity.

6 THE WITNESS: Yes. We did
7 have joint meetings.

8 BY MR. GEISE:

9 Q. How many?

10 A. I don't know.

11 Q. Were these in person?

12 A. By the -- typically not.

13 They were typically over the phone. But
14 there may have been a small number in
15 person.

16 Q. When you say a small number,
17 how many would that be?

18 A. About the reports, per se,
19 it would have been less than five.

20 Q. In addition to in-person
21 meetings with Professors Cutler and
22 McGuire about the report, per se, did you
23 have other in-person meetings with them
24 about other topics related to this

1 litigation?

2 A. We had a series of meetings
3 over the last year, developing our
4 thinking that would go into this set of
5 reports.

6 Q. How many did you have in
7 that series?

8 A. I don't recall exactly.

9 Q. In addition to these
10 in-person meetings, did you also have
11 telephone conferences?

12 A. Yes, we did.

13 Q. How many telephone
14 conferences did you have with Professors
15 Cutler and McGuire to discuss the
16 preparation of your report?

17 A. I don't recall the number.

18 Q. Did the three of you also
19 exchange e-mail communication about the
20 preparation of your reports?

21 A. We -- anything involving the
22 reports we essentially would indirectly
23 communicate, which is we'd communicate
24 through the lawyers.

1 Q. Did you provide input with
2 Professors Cutler and McGuire on what was
3 going to be in their reports?

4 MR. KO: Again, that -- the
5 same instruction that I gave
6 earlier to you -- to you,
7 Dr. Gruber.

8 To the extent the input
9 includes any kind of substance or
10 content to which the attorneys
11 were involved, I'd advise you not
12 to answer.

13 To the extent that there's
14 anything about the identity of the
15 topic, you are free to disclose
16 that to -- to Steve.

17 THE WITNESS: So could you
18 repeat the question?

19 BY MR. GEISE:

20 Q. Sure. Did you provide input
21 with Professors Cutler and McGuire on
22 what was going to be in their reports?

23 A. Yes, I did.

24 Q. Can you describe that input?

1 A. It was in the nature of both
2 before the reports were written,
3 discussing what the structures would be.
4 And in the nature of commenting on drafts
5 of the report as it was being written.

6 Q. Would it be accurate to
7 describe you and Cutler and McGuire as
8 working collaboratively in the
9 preparation of each of your reports?

10 MR. KO: Object to the form.

11 THE WITNESS: I think it
12 was -- we certainly worked
13 collaboratively in deciding what
14 would go in what report.

15 I think in terms of the
16 reports themselves, I would
17 describe it more as commenting on
18 each other's drafts.

19 BY MR. GEISE:

20 Q. Direct your attention back
21 to Exhibit 1, which is your expert
22 report. And also attached to that is the
23 appendix that contains a CV and prior
24 testimony.

1 And, Professor Gruber, is --
2 is the appendix that contains those
3 materials complete and accurate to the
4 best of your knowledge?

5 A. Yes.

6 Q. Is there anything that isn't
7 included in your appendix about either
8 your education, your experience or your
9 publications that would be relevant to
10 your opinions in this matter?

11 A. No.

12 Q. If I can ask you to look at
13 Page 2 of your expert report, and in
14 particular, Paragraph 5.

15 At the beginning of that
16 paragraph, you write, "My work in health
17 economics also includes extensive work on
18 addictive behavior, including significant
19 academic work, federal policy experience,
20 and expert testimony experience in the
21 economics of smoking.

22 "I've written more than a
23 dozen academic papers on the economics
24 of, and government policy towards,

1 smoking."

2 Do you see that?

3 A. Yes, I do.

4 Q. And your CV that's contained
5 in Exhibit 1 contains a list of your
6 publications that have appeared in
7 journals; is that correct?

8 A. Yes.

9 Q. Included in that list are
10 the academic papers that you have written
11 on the economics of, and government
12 policy towards smoking, correct?

13 A. Correct.

14 Q. From a review of your
15 publications, is it correct that you have
16 not written any academic papers in
17 peer-reviewed journals involving
18 prescription opioids?

19 A. That is correct.

20 Q. As part of your CV, you
21 identified experience testifying in
22 matters involving cigarette smoking, and
23 in particular, an evaluation you did of
24 the costs and benefits of cigarette

1 warning labels. Do you recall that?

2 A. Yes.

3 Q. But you have not performed
4 an evaluation of the cost and benefits of
5 warning labels on prescription opioids;
6 is that correct?

7 MR. KO: Object to the form.

8 THE WITNESS: That's
9 correct.

10 BY MR. GEISE:

11 Q. Similarly, you have not
12 performed an evaluation in the costs and
13 benefits of any written communications
14 about prescription opioids; is that
15 correct?

16 MR. KO: Objection.

17 THE WITNESS: Yes.

18 BY MR. GEISE:

19 Q. Your CV identifies a number
20 of articles about the impact of
21 regulations on the tobacco industry,
22 correct?

23 A. Yes.

24 Q. But you have not written any

1 academic paper in a peer reviewed journal
2 on the impact of regulations on
3 prescription opioids; is that correct?

4 A. Yes.

5 Q. Nor have you authored any
6 peer-reviewed paper on the impact of
7 prescription opioid shipments on opioid
8 dependence, correct?

9 A. That's correct.

10 Q. Nor have you authored any
11 peer-reviewed paper on the impact on
12 heroin mortality attributed to shipments
13 of prescription opioids, correct?

14 A. That's correct.

15 Q. In Appendix 1-B to your
16 expert report, you have a list of
17 materials that you considered for
18 purposes of forming your opinions in this
19 case; is that correct?

20 A. Yes, that's correct.

21 Q. Are there any materials that
22 are not disclosed in Appendix 1-B that
23 you considered for your opinions in this
24 case?

1 A. Not intentionally. This is
2 to -- as far as I know, the complete
3 list.

4 Q. From looking at your
5 appendix, you don't identify specifically
6 expert reports from other experts in this
7 case?

8 A. I don't specifically. But
9 if you look at the end of the appendix on
10 Page 5, I say, "and all of the documents
11 cited in this report, the tables and the
12 appendices," and I cite a number of
13 expert -- or other expert reports.

14 Q. And -- and I wasn't trying
15 to -- to catch you in a gotcha moment
16 there.

17 A. Right.

18 Q. That was going to be my next
19 question. That the bottom line of your
20 materials considered list refers back to
21 your report and wraps in anything you
22 might have referred to in your report; is
23 that correct?

24 A. That's correct.

1 MR. KO: Object to form.

2 BY MR. GEISE:

3 Q. If I can direct your
4 attention to that same page of your
5 Appendix 1-B where you list a number of
6 data sources that you consulted for
7 purposes of forming your opinions.

8 Do you see that?

9 A. Yes.

10 Q. I want to ask you about a
11 few of these data sources. The first one
12 is the ARCOS data.

13 Do you see that?

14 A. Yes.

15 Q. How did you get the ARCOS
16 data in this matter?

17 A. I never personally had my
18 hands on the ARCOS data. The ARCOS data
19 was obtained and used by Compass Lexecon
20 under my direction.

21 Q. When you say you never had
22 access to the ARCOS data, I take it it
23 means you never received the underlying
24 data yourself?

1 A. Yes.

2 Q. But you did receive analyses
3 or summaries of the data performed by
4 Compass Lexecon?

5 A. Yes.

6 Q. Professor Gruber, do you
7 recall if you signed a protective order
8 in this case to obtain the ARCOS data?

9 A. I don't recall.

10 Q. Do you know if the people
11 that you will worked with at Compass
12 Lexecon signed a protective order in
13 order to obtain the ARCOS data?

14 A. I don't know.

15 Q. Were you aware that there
16 was a protective order procedure in place
17 in the litigation for folks having access
18 to the ARCOS data?

19 MR. KO: I just want to
20 be -- sorry to interrupt. But I
21 just want to be clear on -- are
22 you asking about private or public
23 ARCOS data? Because both are
24 referenced in the report, so there

1 might be some confusion in the
2 questioning.

3 MR. GEISE: That's fine. I
4 can -- I can clarify that.

5 BY MR. GEISE:

6 Q. Do you know if you signed a
7 protective order at all regarding ARCOS
8 data?

9 A. I don't recall.

10 Q. Do you know if you had
11 access to public or private ARCOS data?

12 A. I did not directly -- did
13 not directly use either public or private
14 ARCOS data in my analysis.

15 Q. I understand you say that
16 you did not directly use it.

17 A. Right.

18 Q. But do you know if the
19 materials that you were provided by
20 Compass Lexecon involved either private
21 or public ARCOS data?

22 A. I know the materials I
23 received from Compass Lexecon involved
24 ARCOS data. I'm not sure about the

1 private or public nature of it.

2 Q. So you didn't do anything to
3 verify if they were providing you
4 information based on public or private
5 ARCOS data?

6 MR. KO: Object to the form.

7 THE WITNESS: No, I do not.

8 BY MR. GEISE:

9 Q. I'm going to jump down a
10 couple spots on your list of data
11 sources. You have the FBI UCR data,
12 which is the Uniform Crime Reporting
13 data, correct?

14 A. Yes.

15 Q. Did you access that data
16 yourself?

17 A. No, I did not.

18 Q. Is that something that
19 Compass Lexecon did?

20 A. Yes.

21 Q. Do you -- did you sign any
22 data use agreement or other agreement
23 with regard to the FBI UCR data?

24 A. I don't recall.

1 Q. Do you know if Compass
2 Lexecon did?

3 A. No, I do not.

4 Q. Jump down a couple spots
5 below. You have NCHS Multiple Causes of
6 Death data.

7 Do you see that?

8 A. Yes, I do.

9 Q. Did you access the NCHS
10 Multiple Causes of Death data yourself?

11 A. No, I did not.

12 Q. Did you, again, rely on
13 Compass Lexecon for that material?

14 A. Yes, I did.

15 Q. And did Compass Lexecon
16 provide you an analysis and summary of
17 that data?

18 MR. KO: Object to the form.

19 THE WITNESS: They provided
20 me various analyses and summaries
21 of that data.

22 BY MR. GEISE:

23 Q. Professor Gruber, did you
24 sign a data use agreement with respect to

1 the NCHS Multiple Causes of Death data?

2 A. I don't recall.

3 Q. Do you know if the people
4 you worked with at Compass Lexecon signed
5 a data use agreement with regard to the
6 NCHS Multiple Causes of Death data?

7 A. No, I don't.

8 Q. From your prior academic
9 research, are you aware that certain NCHS
10 Multiple Causes of Death data is
11 considered restricted access data?

12 A. Yes, I am.

13 Q. Do you know if Compass
14 Lexecon used any restricted access data
15 for purposes of providing you the
16 materials they did as you prepared your
17 report?

18 A. I know that Compass Lexecon
19 used some non-public data. I'm not sure
20 of the technical definition of restricted
21 access.

22 Q. Okay.

23 A. But they used some
24 non-public NCHS mortality death.

1 Q. When you use the "non-public
2 data," is that meant to refer to the fact
3 that you would need to sign a data use
4 agreement to have access to that data?

5 MR. KO: Object to the form.

6 THE WITNESS: That refers to
7 the fact that it's not data that,
8 for instance, I, myself, as an
9 academic researcher, could simply
10 go on the web and download, but
11 rather involves some interaction
12 with the folks who control that
13 data. I don't know the nature of
14 those interactions or what had to
15 be signed.

16 BY MR. GEISE:

17 Q. It's your understanding
18 though from your other academic research
19 that there's some procedure you would
20 have to go through to get access to that
21 restricted access data?

22 A. Typically, in my academic
23 experience, yes.

24 Q. And in your academic

1 experience, have you signed data use
2 agreements to receive access to
3 restricted access data in the past?

4 A. Yes, I have.

5 Q. Do you understand that it
6 would be improper to use restricted
7 access data without a data use agreement
8 for that underlying data?

9 MR. KO: Object to the form.

10 THE WITNESS: I don't know
11 what is true in every context. I
12 know in some contexts that's
13 absolutely true.

14 BY MR. GEISE:

15 Q. Have you in the past ever
16 executed a data use agreement to get the
17 non-public data from the NCHS multiple
18 causes of death data?

19 A. Not that I can recall.

20 Q. You're familiar with other
21 data use agreements though for restricted
22 access data?

23 A. Yes, I am.

24 Q. Did you do anything to

1 verify -- well, let me start that over.

2 You mentioned that you're
3 aware that Compass Lexecon used
4 non-public data, correct?

5 A. Correct.

6 Q. Did you do anything to
7 verify if Compass Lexecon secured a data
8 use agreement to have access to that
9 non-public data?

10 A. No, I did not.

11 Q. Do you know from the
12 material that you relied on from Compass
13 Lexecon, what part of that material is
14 non-public and what part of that material
15 is public?

16 A. No.

17 Q. Did you do anything to
18 ensure that Compass Lexecon had secured
19 the proper approval to use the non-public
20 data from the NCHS multiple causes of
21 death data?

22 MR. KO: Object to form.

23 THE WITNESS: No, I did not.

24 BY MR. GEISE:

1 Q. And I take it that you don't
2 know if Compass Lexecon executed a data
3 use agreement for access to the
4 non-public data?

5 MR. KO: Objection. Asked
6 and answered.

7 THE WITNESS: I don't know.

8 BY MR. GEISE:

9 Q. In your experience of using
10 non-public data in your academic
11 pursuits, are you familiar with
12 limitations on the use of that data, so
13 that it cannot be used for commercial
14 purposes?

15 MR. KO: Object to the form.

16 THE WITNESS: Yes, I am.

17 BY MR. GEISE:

18 Q. And what are the
19 consequences of using non-public data in
20 a commercial purpose?

21 A. I actually don't recall.

22 Q. Did you have any concerns in
23 this matter about using non-public data
24 for purposes of your report and opinions?

1 A. No, I did not.

2 Q. Did you raise any concerns
3 with Compass Lexecon about using
4 non-public data for purposes of your
5 report and opinions?

6 A. I honestly don't recall.

7 Q. Let me jump down to the
8 bottom of your list of data sources, and
9 you identify the National Historical
10 Geographic Information System.

11 Do you see that?

12 A. Yes, I do.

13 Q. First of all, what is that?

14 A. That's essentially data
15 which summarizes information from
16 nationally representative surveys in
17 geographic units.

18 Q. How did you access that
19 data?

20 A. Once again, I did not access
21 that data.

22 Q. Professor Gruber, in looking
23 at all of your data sources listed on
24 Page 5 in your appendix, is there any

1 data that you personally accessed for
2 purposes of forming your opinion?

3 MR. KO: Object to the form.

4 THE WITNESS: No.

5 BY MR. GEISE:

6 Q. So all of the access to the
7 data sources listed in your appendix was
8 done through Compass Lexecon?

9 A. Yes.

10 Q. Were there any other
11 organizations that were involved in
12 collecting data that you ultimately
13 relied on for purposes of your opinions,
14 leaving out counsel?

15 A. I don't believe so.

16 Q. Have you ever heard of an
17 organization that goes by the acronym
18 PIRE, P-I-R-E?

19 A. It sounds vaguely familiar.

20 Q. I think it stands for the
21 Pacific Institute For Research
22 Evaluation?

23 A. Once again it sounds vaguely
24 familiar.

1 Q. If it's vaguely familiar,
2 did you have any involvement with PIRE
3 for purposes of forming your opinions in
4 this case?

5 A. Not -- not directly.

6 Q. Well, when you say not
7 directly, that causes me to ask the
8 follow-up.

9 Did you have any indirect
10 contact with PIRE for purposes of forming
11 your opinions in this case?

12 A. I don't mean not directly.
13 The difficult -- I just mean that people
14 I had contact with may have had contact
15 with them that I don't know of. But I
16 don't recall having a direct -- any
17 contact with them.

18 Q. And that's a good
19 clarification. To your knowledge, did
20 anyone you were working with have any
21 communication with PIRE for purposes of
22 the -- the data and materials you relied
23 on in this case?

24 A. Not that I recall.

1 Q. Your appendix on Page 4 also
2 lists nine interviews that were
3 conducted.

4 Do you see that?

5 A. Yes.

6 Q. And did you, Professor
7 Gruber, conduct these interviews
8 yourself?

9 A. I was present for interviews
10 with these individuals.

11 Q. And from the dates
12 identified, all of these interviews took
13 place on the same date, July 11, 2018,
14 correct?

15 A. That's correct.

16 Q. You said you were present
17 for those interviews. Who else was
18 present?

19 A. I don't recall the full
20 list, but it was myself and Tom McGuire
21 was present for -- there were two
22 interviews. One with the set of
23 individuals -- I don't recall the exact
24 split. But one with fire and EMS and

1 police, and one with human services.

2 Professor McGuire was
3 present for the first. I don't think he
4 was present for the second, but I don't
5 recall for sure. And then staff from
6 Compass Lexecon, but I don't exactly
7 recall who, were present at both
8 meetings. And at least one legal counsel
9 was present at both meetings.

10 Q. When you say staff from
11 Compass Lexecon, are you referring to
12 Mr. Sider and Mr. McKay?

13 A. I know it was not either
14 Mr. Sider or Mr. McKay. But I don't
15 recall which staff it was.

16 Q. How many staff members from
17 Compass Lexecon attended those
18 interviews?

19 A. I believe one.

20 Q. Who determined what
21 individuals would be interviewed if you
22 know?

23 MR. KO: Again I'm going to
24 instruct you not to answer or not

1 to disclose the contents of the
2 communication or any rationale or
3 substance behind that
4 determination.

5 But again you're free to
6 disclose the identity and -- and
7 topics that were potentially
8 discussed.

9 MR. GEISE: I can rephrase,
10 Professor Gruber.

11 BY MR. GEISE:

12 Q. Did you determine what
13 individuals would be interviewed?

14 A. No, I did not.

15 Q. Did you make a request to
16 interview specific individuals for
17 purposes of forming your opinions in this
18 case?

19 A. No, I did not.

20 Q. Do you rely on these
21 interviews for anything in your report?

22 A. No, I do not.

23 Q. Did you take any notes from
24 these interviews?

1 A. I don't believe so.

2 Q. Of the nine interviewees
3 listed, I believe they're all associated
4 with either a Cuyahoga County division or
5 a Cleveland division; is that correct?

6 And it's -- it's inartfully
7 phrased because I don't know how to
8 summarize all of those different
9 entities, but...

10 A. Yes, that's correct.

11 Q. Did you interview anyone
12 from Summit County?

13 A. No, I did not.

14 Q. Professor Gruber, have you
15 reviewed any documents that have been
16 produced by Cuyahoga County or Summit
17 County in this litigation?

18 A. I don't recall.

19 Q. Looking at Page 2 of your
20 CV, which is attached as Appendix 1-A to
21 your report. You list a handful of past
22 expert testimony; is that correct?

23 A. Yes.

24 Q. Is that a complete and

1 accurate list of your past expert
2 testimony in either deposition or trial?

3 A. As far as I'm -- no, it --
4 it's an attempt to be as complete, to be
5 complete.

6 Q. Did any of your prior
7 testimony relate to addiction or
8 dependence to opioids?

9 A. No, it did not.

10 Q. Did any of your prior
11 testimony relate to the shipment of
12 prescription opioids?

13 A. No, it did not.

14 Q. And while you refer in your
15 report at different times to addictive
16 behaviors, you don't consider yourself an
17 expert in addictive behaviors, do you?

18 MR. KO: Object to form.

19 THE WITNESS: I consider
20 myself an expert in the economic
21 issues and policy around addictive
22 behaviors.

23 BY MR. GEISE:

24 Q. In terms of making a

1 diagnosis of somebody with having an
2 addiction or a use disorder, that's not
3 something you would do?

4 MR. KO: Object to the form.

5 THE WITNESS: No, that's not
6 something I would do.

7 BY MR. GEISE:

8 Q. Professor Gruber, I want to
9 turn to Paragraph 11 of your report and
10 specifically ask you. You write, "Two
11 economic questions arise in connection
12 with these allegations. First, is it
13 possible to evaluate from an economic
14 perspective the extent to which the
15 actions of the defendants contributed to
16 this epidemic? Second, is it possible to
17 estimate the damages to the bellwether
18 government entities resulting from the
19 defendants' actions using principles of
20 applied economics?"

21 Do you see that?

22 A. Yes, I do.

23 Q. In this paragraph and
24 throughout your expert report, you use

1 the term "defendants." Can you define
2 how you use that term?

3 A. I use that term in my
4 understanding to refer to the set of
5 entities that are being -- that are
6 defendants in this litigation.

7 Q. Can you identify the set of
8 entities that are being sued in this
9 litigation?

10 A. Not completely, no.

11 Q. How many of the entities
12 that have been sued in this litigation
13 can you name?

14 A. It depends how long you want
15 to give me. But I can certainly name a
16 number of them.

17 Q. Now, your recitation of the
18 two economic questions that arose, that
19 you address in your report, it does not
20 include an evaluation to the extent which
21 the actions of a specific entity who has
22 been sued in this case contribute to what
23 you call an epidemic, correct?

24 MR. KO: Object to the form.

1 THE WITNESS: That's
2 correct.

3 BY MR. GEISE:

4 Q. Similarly, your recitation
5 doesn't include an estimate of damages
6 that result from a specific entity's
7 actions, correct?

8 A. The report includes the
9 damages that result from the collective
10 set of actions of the defendants.

11 Q. And when you speak of the
12 collective set of actions, you have not
13 done anything to parcel out damages
14 attributable to a specific defendant,
15 correct?

16 A. Correct.

17 Q. Neither as a contributor to
18 the epidemic as you call it, correct?

19 MR. KO: Object to the form.

20 THE WITNESS: Correct.

21 BY MR. GEISE:

22 Q. And -- and not as to the
23 question of damages, correct?

24 A. Correct.

1 Q. Is it accurate to say that
2 you do not intend to offer an opinion in
3 this case regarding a specific defendant?

4 A. Yes, that's accurate.

5 Q. Turning to Page 8 of your
6 report in Paragraph 15. You set out what
7 you've been asked by counsel for the
8 bellwether plaintiffs to specifically
9 address.

10 Do you see that?

11 A. Yes, I do.

12 Q. First it says you've been
13 asked to provide, from the perspective of
14 accepted principles of economics, an
15 overview of the nation's opioid crisis.

16 Do you see that?

17 A. Yes, I do.

18 Q. Does that reflect your
19 understanding of that part of your
20 assignment?

21 A. Yes, it does.

22 Q. In connection with that
23 section of your report are you providing
24 those opinions to a reasonable degree of

1 certainty in the field of economics?

2 A. That -- yes. I'm an
3 economist. So that's what I'm doing.

4 Q. Look at the second part of
5 Paragraph 15. You write, "Second, I have
6 been asked whether, to a reasonable
7 degree of certainty in the field of
8 economics, the defendants' shipments of
9 prescription opioids contributed in whole
10 or part to the growth in the misuse of
11 opioids and the increases in licit and
12 illicit opioid-related mortality over the
13 past 20 years and to explain the bases
14 for my opinion."

15 Do you see that?

16 A. Yes.

17 Q. And does that accurately
18 reflect your understanding of that part
19 of your assignment?

20 A. Yes, it does.

21 Q. Professor Gruber, was
22 your -- were you requested to form an
23 opinion regarding shipments to Cuyahoga
24 County and Summit County in particular?

1 A. I don't quite understand the
2 question.

3 Q. Sure. So you indicate that
4 you were asked whether shipments of
5 prescription opioids contributed to the
6 growth and the misuse of opioids and
7 increases in licit and illicit
8 opioid-related mortality, right?

9 A. Right.

10 Q. Were you asked to focus
11 specifically on Cuyahoga and Summit
12 County for purposes of that question?

13 A. I was asked to focus
14 specifically on them in terms of
15 documenting the, as you'll see in the
16 report, the underlying change in both
17 shipments in harms in Cuyahoga and Summit
18 as well as nationally.

19 Q. When you say as well as
20 nationally, are Cuyahoga and Summit part
21 of the national picture?

22 A. Yes.

23 Q. And as part of your
24 analysis, did you look at the national

1 picture and then apply that to Cuyahoga
2 and Summit?

3 MR. KO: Object to the form.

4 THE WITNESS: I looked at
5 the national picture and
6 separately the Cuyahoga and Summit
7 situation.

8 BY MR. GEISE:

9 Q. Have you made any effort to
10 determine the specific shipments of
11 prescription opioids from any particular
12 defendant in this case?

13 MR. KO: Object to the form.

14 THE WITNESS: No, I have
15 not.

16 BY MR. GEISE:

17 Q. Have you made any effort to
18 determine a specific defendants'
19 shipments of opioids to Cuyahoga or
20 Summit County?

21 MR. KO: Object to the form.

22 THE WITNESS: No, I have
23 not.

24 BY MR. GEISE:

1 Q. As you mentioned before,
2 does your analysis only consider the
3 impact of aggregate opioid shipments?

4 MR. KO: Objection.

5 THE WITNESS: As laid out in
6 the report, we define both
7 aggregate opioid shipments, and in
8 some places we parse out different
9 types of opioids. So -- but
10 that's the finest detail we go
11 into.

12 BY MR. GEISE:

13 Q. You don't go into a detail
14 with respect to a particular defendants'
15 shipment of opioids, correct?

16 A. Correct.

17 Q. And if I wanted to ask you
18 today about if you had any opinions about
19 any specific defendant with regard to
20 their shipments, you're not prepared to
21 address that?

22 A. I'm not, no.

23 Q. You agree that prescription
24 opioids come in many different forms,

1 correct?

2 A. Yes.

3 Q. And you agree that different
4 pharmaceutical manufacturers make
5 different prescription opioids?

6 A. Yes.

7 Q. Your analysis did not
8 differentiate between different
9 pharmaceutical manufacturers, correct?

10 MR. KO: Objection.

11 THE WITNESS: That's
12 correct.

13 BY MR. GEISE:

14 Q. And you didn't -- did you do
15 anything to limit your analysis to
16 shipments by pharmaceutical manufacturers
17 who are defendants in this lawsuit?

18 A. I'll just need one minute to
19 check the appendix.

20 No, I didn't.

21 Q. Similarly, did you do
22 anything to limit your analysis to
23 shipments by distributors who are
24 defendants in this lawsuit?

1 A. No, I didn't.

2 Q. With respect to the entities
3 who are defendants in this lawsuit,
4 you're not saying that each defendant is
5 jointly and severally liable for the
6 damages to the bellwether government
7 entities, are you?

8 MR. KO: Object to the form.

9 THE WITNESS: I'm not really
10 speaking to that issue.

11 BY MR. GEISE:

12 Q. You don't have an opinion on
13 that, correct?

14 MR. KO: Same objection.

15 THE WITNESS: I'm an
16 economist. That's a legal
17 question.

18 BY MR. GEISE:

19 Q. If I can turn your attention
20 to Paragraph 16 of your report that spans
21 from Page 8 to Page 10. Look at the
22 first bullet point on Paragraph 16. You
23 write, "There is a direct causal
24 relationship between defendants'

1 shipments of prescription opioids and the
2 misuse and mortality from prescription
3 opioids with geographic areas that
4 received higher volumes of per capita
5 shipments of prescription opioids
6 experiencing significantly higher rates
7 of opioid-related misuse and mortality,
8 including the bellwether jurisdictions."

9 Do you see that?

10 A. Yes, I do.

11 Q. As stated in this paragraph,
12 does prescription opioids include
13 prescription opioids that are used both
14 for medical purposes and those that are
15 not used for medical purposes?

16 MR. KO: Object to the form.

17 THE WITNESS: This uses data
18 from ARCOS shipments, which I do
19 not believe distinguishes the
20 purpose of the prescription
21 opioid.

22 BY MR. GEISE:

23 Q. If you look at the next
24 bullet point on the top of Page 9, you

1 write, "There is a direct causal
2 relationship between defendants'
3 shipments of prescription opioids and the
4 misuse of and mortality from illicit
5 opioids, including heroin and fentanyl,
6 which accelerated rapidly after 2010."

7 Do you see that?

8 A. Yes, I do.

9 Q. When you used the term
10 "illicit opioids" here, are you excluding
11 the nonmedical use of prescription
12 opioids in that definition?

13 MR. KO: Object to the form.

14 THE WITNESS: Yes, I am.

15 BY MR. GEISE:

16 Q. And again, with respect to
17 both of these bullet points in Paragraph
18 16 of your report, you've done nothing to
19 establish a direct causal relationship
20 between a specific defendant's shipment
21 of prescription opioids and the harm that
22 you say follows, correct?

23 A. That's correct.

24 Q. Look at the next sentence in

1 that top bullet point on Paragraph 9 of
2 your expert report. You write, "As has
3 been widely recognized in the economic
4 literature, the growth in the dependence
5 on prescription opioids from the early
6 1990s to 2010, coupled with a variety of
7 factors starting in and around 2010,
8 created an increased demand for illicit
9 opioids, including heroin and later
10 fentanyl.

11 "These factors included the
12 release of an abuse-deterrent formulation
13 of OxyContin, the increase in state level
14 prescription drug monitoring programs,
15 caps on opioid prescribing, and law
16 enforcement investigation and
17 prosecutions against pill mills
18 throughout the country."

19 Do you see that?

20 A. Yes, I do.

21 Q. Professor Gruber, is it your
22 opinion that the release of an
23 abuse-deterrent formulation of OxyContin
24 caused an increased demand for illicit

1 opioids, including heroin and fentanyl?

2 MR. KO: Object to the form.

3 THE WITNESS: Yes, it is.

4 BY MR. GEISE:

5 Q. Is it your opinion that the
6 increase in state level prescription drug
7 monitoring programs caused an increased
8 demand for illicit opioids including
9 heroin and fentanyl?

10 MR. KO: Same objection.

11 THE WITNESS: Yes, it is.

12 BY MR. GEISE:

13 Q. Is it your opinion that caps
14 on opioid prescribing cause an increased
15 demand for illicit opioids, including
16 heroin and fentanyl?

17 MR. KO: Same objection.

18 THE WITNESS: Yes, it is.

19 BY MR. GEISE:

20 Q. And is it your opinion that
21 law enforcement investigations and
22 prosecutions caused an increased demand
23 for illicit opioids, including heroin and
24 fentanyl?

1 MR. KO: Same objection.

2 THE WITNESS: Yes, it is.

3 BY MR. GEISE:

4 Q. Professor Gruber, have you
5 apportioned how each of those causal
6 factors contributed to illicit opioid
7 use?

8 A. No, I have not.

9 Q. And the list that you
10 provide of factors in that second bullet
11 point on paragraph -- in Paragraph 16 of
12 your report, that's not an exhaustive
13 list of factors that contribute to an
14 increased demand for illicit opioids, is
15 it?

16 A. No.

17 Q. Other factors could include
18 the ease of accessibility to illicit
19 opioids, correct?

20 MR. KO: Object to the form.

21 THE WITNESS: That's
22 correct.

23 BY MR. GEISE:

24 Q. Internet availability for

1 illicit opioids, correct?

2 A. Correct.

3 Q. It could also include the
4 affordability of illicit opioids,
5 correct?

6 A. That's correct.

7 Q. On Page 11 of your expert
8 report, in Paragraph 19, you spell out
9 kind of a table of contents or
10 organization to your report, correct?

11 A. Yes.

12 Q. I want to ask you about
13 Section 6 where you say, "It establishes
14 that shipments of prescription opioids
15 are also associated with higher crime."

16 Do you see that?

17 A. Yes, I do.

18 Q. Now, when we looked at
19 Paragraph 15 of your report where you
20 identified what you were requested to do,
21 I don't believe there was a request there
22 to look at any relationship between
23 shipment of prescription opioids and an
24 association with higher crime; is that

1 correct?

2 A. That's correct. That
3 sentence doesn't say that.

4 The -- the request was to
5 consider more broadly the growth and
6 misuse in opioids and increase in harms
7 caused by opioids. I refer to mortality
8 there, but we also use crimes and other
9 evidence of the harms that were caused by
10 opioids.

11 Q. Were you asked to look at
12 crime for part of your research in this
13 case or was that something you decided to
14 do?

15 A. I was asked to.

16 Q. As you mentioned earlier,
17 you discussed the preparation of your
18 report with a number of other experts,
19 correct?

20 A. Yes, that's correct.

21 Q. And in your report, you
22 refer to a number of other expert
23 reports, correct?

24 A. Yes, I do.

1 Q. If I could ask you to look
2 at Page 7, Paragraph 13 of your report.
3 That paragraph refers to --

4 MR. KO: Give him a second
5 to get there.

6 MR. GEISE: Oh sure, I'm
7 sorry.

8 BY MR. GEISE:

9 Q. Are you there, Professor
10 Gruber?

11 A. Yes, I am.

12 Q. In paragraph 13 you indicate
13 that "other economists will also be
14 submitting expert reports addressing" --
15 "addressing certain aspects of the
16 questions that you were answering,"
17 correct?

18 A. Yes.

19 Q. And you identify in that
20 paragraph Professor Meredith Rosenthal,
21 Professor David Cutler, and Professor
22 Thomas McGuire, correct?

23 A. Correct.

24 Q. Now, earlier in the

1 deposition when you identified experts
2 that you talked to during the preparation
3 of your report, you identified Professors
4 Cutler and McGuire, but you did not
5 identify Professor Rosenthal?

6 A. That's correct.

7 Q. Did you have any calls or
8 meetings with Professor Rosenthal during
9 the preparation of your report?

10 A. During the preparation of
11 this written report, about this report, I
12 did not. I had a number of calls and
13 meetings with Professor Rosenthal
14 throughout the process of this litigation
15 that led to -- that led to the
16 construction of the set of reports
17 including her own. But in terms of the
18 construction of this report, I did not --
19 I don't recall receiving specific
20 comments or assistance from her on this
21 report.

22 Q. Earlier you testified that
23 for a series of time you and Professor
24 Cutler and Professor McGuire discussed

1 the overview of what -- the issues that
2 you would cover. Do you recall that
3 testimony?

4 MR. KO: Object to the form.

5 THE WITNESS: Yes, I do.

6 BY MR. GEISE:

7 Q. Was Professor Rosenthal also
8 involved in some of those initial
9 discussions?

10 A. Yes, she was.

11 Q. Did you have in-person
12 meetings where Professor Rosenthal joined
13 you and Professors Cutler and McGuire?

14 A. Yes.

15 Q. Do you recall how many?

16 A. No.

17 Q. Now, in Paragraph 13 you
18 broadly identify the subject matter of
19 the other experts' individual reports, is
20 that fair?

21 A. That's what I try to do,
22 yes.

23 Q. Are you deferring to each of
24 those experts as to the subject matter in

1 his or her report?

2 MR. KO: Object to the form.

3 THE WITNESS: I guess I
4 don't understand what that means.

5 BY MR. GEISE:

6 Q. Sure. Where you -- you have
7 their reports, you know what they address
8 in their reports, do you intend to
9 address the same topics that they address
10 in their reports or are you deferring to
11 them on that point?

12 MR. KO: Same objection.

13 THE WITNESS: They are --
14 there is a significant overlap in
15 the topics I address with
16 Professor Cutler's report,
17 although the reports are distinct
18 and do separate things.

19 BY MR. GEISE:

20 Q. Did you do anything on your
21 own to validate the opinions offered in
22 Professor Rosenthal's report?

23 MR. KO: Object to the form.

24 THE WITNESS: I don't

1 understand the question.

2 BY MR. GEISE:

3 Q. You are familiar with the
4 opinions that Professor Rosenthal draws
5 in her report?

6 A. Yes, I am.

7 Q. Did you do anything to check
8 her opinions?

9 MR. KO: Object to the form.

10 THE WITNESS: I read at
11 least one draft of her report.

12 BY MR. GEISE:

13 Q. Professor Rosenthal has a
14 number of mathematical computations in
15 her report, correct?

16 A. Yes.

17 Q. Did you do anything to check
18 her math on those computations?

19 A. While Professor Rosenthal --
20 I think it's important to distinguish the
21 report from the long process that led to
22 the report.

23 Q. Sure.

24 A. During that long process we

1 discussed at length the methodologies she
2 was using in her report. In the draft of
3 the report, I didn't comment on the
4 specific mathematical underlying aspects
5 of her report.

6 Q. Is that true with regard to
7 Professor Cutler's report and Professor
8 McGuire's report as well?

9 A. No. For Professor Cutler
10 and McGuire's report, I had more detailed
11 interactions where I commented on
12 specific aspects of their analysis.

13 Q. Do you recall what detailed
14 comments you had with regard to Professor
15 Cutler's analysis?

16 MR. KO: And again, same
17 instruction I gave previously. To
18 the extent that these comments
19 happened in the context of
20 communications involving counsel,
21 I'd instruct you not to disclose
22 the substance or the content of
23 those communications.

24 THE WITNESS: Broadly we

1 discussed the whole set of issues
2 around the empirical strategy used
3 in their reports. Both, you know,
4 over the -- over the long run sort
5 of getting to their reports, and
6 specifically what they do in their
7 reports.

8 BY MR. GEISE:

9 Q. Can you recall anything
10 specifically that you discussed?

11 MR. KO: Same instructions
12 as previously given a moment ago.

13 THE WITNESS: I guess I
14 don't understand the question.

15 BY MR. GEISE:

16 Q. Well, you used the term that
17 you discussed the whole set of issues
18 around the empirical strategy used in
19 their reports. What did you discuss
20 about the empirical strategy used in
21 Professor Cutler's report?

22 MR. KO: Same instruction.

23 THE WITNESS: So we
24 discussed, you know, everything

1 ranging from the functional forms
2 that he used in his regressions to
3 what variables would be included,
4 things of that nature.

5 BY MR. GEISE:

6 Q. Did you discuss with
7 professor Cutler the reliance on national
8 data as opposed to data specific to
9 Summit and Cuyahoga County?

10 MR. KO: Object to the form.

11 THE WITNESS: I believe I
12 did, but I don't recall those
13 conversations.

14 BY MR. GEISE:

15 Q. Did you have similar
16 discussions with Professor McGuire around
17 the empirical strategy used in his
18 report?

19 A. Yes, I did.

20 Q. Do you recall anything
21 specific about the discussion about the
22 empirical strategy in Professor McGuire's
23 report?

24 MR. KO: Same instruction as

1 I gave previously.

2 THE WITNESS: Once again, we
3 had a lot of conversations about
4 many aspects of his report, you
5 know, ranging from, you know, how
6 to think about which costs to
7 include for each department, to
8 other topics of that nature.

9 BY MR. GEISE:

10 Q. And as part of these
11 discussions with Professor Cutler and
12 Professor McGuire, did you ever prepare
13 any written comments to them or
14 suggestions with regard to the empirical
15 strategy that they used?

16 A. Yes.

17 Q. And did you share that with
18 Professor Cutler and Professor McGuire?

19 A. I was shared the comments
20 with attorneys. And I believe attorneys
21 then shared them with the other experts.

22 Q. Do you recall if Professor
23 Cutler made any changes to his empirical
24 strategy after receiving comments from

1 you?

2 MR. KO: Same instruction as
3 previously given.

4 THE WITNESS: I don't recall
5 specific instances.

6 BY MR. GEISE:

7 Q. Do you recall if Professor
8 McGuire made any changes to his empirical
9 strategy after receiving comments from
10 you?

11 MR. KO: Same instruction.

12 THE WITNESS: I don't recall
13 specific instances.

14 BY MR. GEISE:

15 Q. Now, on Page 7 of your
16 report in Footnote 15, you state, "I
17 understand a separate report will present
18 an estimate of the share of shipments
19 that distributor defendants could
20 reasonably have been expected to identify
21 as excessive and/or potentially
22 suspicious, but that this report does not
23 need to be disclosed until April 15,
24 2019."

1 Do you see that?

2 A. Yes, I do.

3 Q. Do you know if that report
4 has now been disclosed?

5 A. No, I don't.

6 Q. Do you know who was
7 preparing that report?

8 A. No, I don't.

9 Q. Do you know if it was any
10 particular expert?

11 A. No, I don't.

12 Q. And if you haven't seen that
13 report and you don't know who prepared
14 it, is it accurate to say that you don't
15 know what that estimate of the share of
16 shipments that a distributor defendant
17 could reasonably have been expected to
18 identify as excessive and/or potentially
19 suspicious was?

20 MR. KO: Object to the form.

21 THE WITNESS: That's a long
22 question. I don't --

23 BY MR. GEISE:

24 Q. It is. I can try -- let me

1 try to break it up.

2 You don't know if such a
3 report exists, correct?

4 A. Correct.

5 Q. So you don't know what's in
6 that report, correct?

7 A. Correct.

8 Q. So you don't know what that
9 report would say about an estimate of the
10 share of shipments that distributor
11 defendants could reasonably have been
12 expected to identify as excessive and/or
13 potentially suspicious, correct?

14 MR. KO: Object to the form.

15 THE WITNESS: Correct.

16 BY MR. GEISE:

17 Q. Professor Gruber, what was
18 your purpose of including this footnote
19 in your report if you don't know who
20 wrote the report and you haven't seen the
21 report?

22 A. The purpose was that I was
23 documenting the other expert reports to
24 be included. And so for completeness,

1 since I was told that this report would
2 be included, I thought I'd include the
3 footnote to note it.

4 Q. Did you have any discussion
5 with Professors Cutler, McGuire or
6 Rosenthal with regard to that forthcoming
7 separate report?

8 MR. KO: On this question.
9 The same instruction that I gave
10 you before. To the extent that
11 these communications involve
12 counsel, I ask that you not --
13 instruct you not to disclose the
14 contents of such communications.

15 THE WITNESS: We discussed
16 the general issue of how one would
17 think about this problem. So we
18 had sort of a broad conversation
19 about that. But we weren't -- it
20 wasn't specific to a given report.

21 BY MR. GEISE:

22 Q. Professor Gruber, is it
23 correct that you do not intend to offer
24 an opinion on the allocation of

1 responsibility for shipment volumes
2 between any of the defendants in this
3 case?

4 MR. KO: Object to the form.

5 THE WITNESS: That's
6 correct.

7 BY MR. GEISE:

8 Q. You don't have the
9 underlying data or information to even
10 form that opinion, do you?

11 MR. KO: Object to the form.

12 THE WITNESS: I haven't
13 looked at it. I don't -- you
14 know, no, I have not used any data
15 of that nature.

16 BY MR. GEISE:

17 Q. Looking at Paragraph 14 of
18 your report, you write -- let's go down,
19 I think, to the second sentence.

20 "Analyses presented below established
21 that per capita shipments of prescription
22 opioids varied widely across geographic
23 areas that are otherwise comparable in
24 terms of population demographics. This

1 pattern indicates that many such
2 shipments of prescription opioids were
3 potentially suspicious and that such
4 shipments were not identified and
5 prevented by CSA registrants.

6 "This in turn suggest that a
7 potentially substantial share of harms
8 associated with shipments of opioids due
9 to manufacturers' misconduct could have
10 been avoided if CSA registrants,
11 including distributors, had met their
12 obligation to monitor and prevent
13 excessive shipments."

14 Do you see that?

15 A. Yes, I do.

16 Q. If a potentially substantial
17 share of harms could have been avoided,
18 do you agree that some percentage of
19 harms could not have been avoided?

20 MR. KO: Object to the form.

21 THE WITNESS: I don't -- I
22 don't know. Substantial share
23 could include 100 percent, so I
24 don't know for sure. I don't try

1 to apportion that.

2 BY MR. GEISE:

3 Q. Okay. In addition to not
4 trying to apportion it, do you have an
5 opinion whether it's 100 percent or a
6 number somewhat below that?

7 A. I don't have an opinion on
8 that.

9 Q. Professor Gruber, do you
10 intend to offer an opinion as to a
11 specific share of such shipments?

12 A. No, I do not.

13 Q. And in particular, you don't
14 offer any opinion with regard to a
15 specific defendant in this case and their
16 obligation to monitor and prevent
17 excessive shipments, correct?

18 MR. KO: Object to the form.

19 THE WITNESS: Correct.

20 BY MR. GEISE:

21 Q. I could go through a list of
22 all of the defendants in the case, and
23 your answer would be the same, correct?

24 A. That's correct.

1 Q. When you write that harms
2 could have been avoided if CSA
3 registrants had met their obligation to
4 monitor and prevent excessive shipments,
5 do you include all CSA registrants?

6 A. I am speaking generally
7 about CSA registrants. I don't know
8 that -- I don't use the sentence to claim
9 that I know for sure that every single
10 CSA registrant -- how every single CSA
11 registrant behaved.

12 Q. Do you know how any CSA
13 registrant behaved with regard to
14 identifying and preventing the shipment
15 of potentially suspicious shipments?

16 A. Not individually, no.

17 Q. Do you include physicians or
18 prescribers with DEA registrations within
19 the definition of CSA registrants?

20 A. I'm not sure if they are
21 included in the definition. This
22 sentence as I wrote it was meant to refer
23 primarily to distributors. I was writing
24 it to include other registrants that

1 might potentially be involved, but my
2 focus in this sentence was on
3 distributors.

4 Q. You agree that physicians
5 and prescribers with DEA registrations to
6 write prescriptions for controlled
7 substances also qualify as CSA
8 registrants, correct?

9 A. I don't know for sure.

10 Q. Do you agree that a
11 potentially substantial share of harms
12 associated with shipments of opioids
13 could have been avoided if prescribers
14 met their obligations with respect to
15 writing prescriptions of controlled
16 substances?

17 MR. KO: Object -- object to
18 the form.

19 THE WITNESS: That's not
20 really something I've studied.

21 BY MR. GEISE:

22 Q. So you don't know how the
23 potential share of harms attributable to
24 a prescriber compares to a potentially

1 substantial share of harms associated
2 with distributors, correct?

3 MR. KO: Same -- same
4 objection. And objection to
5 scope.

6 THE WITNESS: No, I don't.

7 BY MR. GEISE:

8 Q. Did you conduct any analysis
9 to determine the share of harms that
10 could have been avoided based on the
11 actions of prescribers?

12 MR. KO: Same two prior
13 objections as previously stated.

14 THE WITNESS: I did not, no.

15 BY MR. GEISE:

16 Q. Professor Gruber, are you
17 aware that the Drug Enforcement
18 Administration and other law enforcement
19 agencies are charged with enforcing laws
20 to prevent the distribution and use of
21 illicit drugs in the United States?

22 A. Yes, I am.

23 Q. Are you aware that the DEA
24 has a mission to enforce the controlled

1 substance laws and regulations in the
2 United States?

3 A. Yes, I am.

4 Q. And you agree that mission
5 includes reducing the availability of
6 illicit controlled substances on the
7 domestic and international market,
8 correct?

9 A. I don't know specifically if
10 that's in the mission statement, but
11 certainly that would seem to be part of
12 the scope of what they should be doing.

13 Q. Part of the scope of what
14 the DEA should be doing also involves
15 enforcing the provisions of the
16 Controlled Substances Act as they pertain
17 to the manufacture, distribution, and
18 dispensing of legally produced controlled
19 substances, correct?

20 A. I do not know.

21 Q. One of the harms that you
22 identify in your report associated with
23 the shipment of prescription opioids is
24 mortality from illicit drugs, correct?

1 A. Correct.

2 Q. Do you agree that a
3 potentially substantial share of harms
4 associated with shipment of opioids could
5 have been avoided if the DEA reduced the
6 availability of illicit controlled
7 substances on the domestic market?

8 MR. KO: Object to the form.
9 Objection as to scope.

10 THE WITNESS: I -- I
11 don't -- no, I don't necessarily
12 agree.

13 BY MR. GEISE:

14 Q. So in your report where you
15 say that a potentially substantial share
16 of harms associated with shipments of
17 opioids due to manufacturers' misconduct
18 could have been avoided if CSA
19 registrants, including distributors, had
20 met their obligation to monitor and
21 prevent excessive shipments. And with
22 respect to that, I think you told me you
23 don't have a specific percentage in mind,
24 correct?

1 MR. KO: Are -- are you --
2 where are we at?

3 MR. GEISE: Paragraph 14 of
4 his report.

5 MR. KO: Okay. Sorry.

6 THE WITNESS: Yes, I don't
7 have a specific percentage in
8 mind.

9 BY MR. GEISE:

10 Q. And as part of your
11 analysis, did you do anything to
12 determine a particular percentage of harm
13 that could have been avoided depending on
14 the actions or inactions of the DEA?

15 MR. KO: Objection.

16 THE WITNESS: No, I did not.

17 BY MR. GEISE:

18 Q. And you also did not perform
19 any analysis to see what percentage of
20 harm could have been avoided based on
21 actions or inactions of prescribers,
22 correct?

23 MR. KO: Same objections.

24 THE WITNESS: That's

1 correct.

2 BY MR. GEISE:

3 Q. Professor Gruber, in
4 Paragraph 20 of your report, you start
5 the paragraph by saying, "Opioids have
6 long been used to treat pain in the U.S.
7 and around the world, as well as having
8 long been abused leading to addiction and
9 death."

10 Do you see that?

11 A. Yes, I do.

12 Q. And according to the
13 analysis in Paragraph 20 of your report,
14 you indicate that that knowledge goes
15 back into the 19th century, correct?

16 A. That's correct.

17 Q. The knowledge that opioids
18 have long been abused leading to
19 addiction and death has been known to
20 doctors for decades and centuries,
21 correct?

22 MR. KO: Object to the form.

23 THE WITNESS: I -- that

24 sentence has two parts. It refers

1 to the fact they've long been used
2 to treat pain, as well as long
3 being abused.

4 I guess I don't know for
5 sure how -- how -- I know the
6 treatment of pain by opioids
7 definitely goes back centuries.
8 The knowledge that it can be
9 abused, I'm not sure how far that
10 goes back.

11 BY MR. GEISE:

12 Q. Well, you agree that the
13 addictive potential for opioids is long
14 established in the medical literature,
15 correct?

16 A. Correct.

17 Q. Okay. And the knowledge of
18 that goes back a number of decades,
19 correct?

20 A. Certainly a number of
21 decades.

22 Q. And that would be knowledge
23 available to physicians?

24 A. Yes.

1 Q. The FDA?

2 A. Sure.

3 Q. The DEA?

4 A. Yes.

5 Q. The State of Ohio?

6 A. Yes.

7 Q. And the counties of Cuyahoga
8 and Summit in Ohio, correct?

9 A. That's correct.

10 Q. Professor Gruber, are you
11 familiar with the concept of diversion
12 with regard to controlled substances?

13 A. Yes.

14 Q. Do you have a definition
15 that you use of diversion?

16 A. I might. Somewhere in the
17 report I could spend a few minutes
18 looking through, or I could tell you --
19 you know, but I certainly have a view of
20 what it is. I'm not sure where, if I
21 specifically defined it in the report.

22 Q. Are you aware of what the
23 National Academy's of Science definition
24 of the term "diversion" is?

1 A. I'm sure I read it at some
2 point, but I don't recall what it is.

3 Q. Does it -- and I can show it
4 to you. Does it sound familiar that the
5 definition used by NAS is diverted before
6 being dispensed, i.e., diverted from
7 lawful channels of commercial
8 distribution such as wholesalers and
9 pharmacies?

10 MR. KO: Objection. If you
11 want to show them to him, I mean.
12 I thought you said this wasn't a
13 memory test.

14 MR. GEISE: Yeah, we can.

15 BY MR. GEISE:

16 Q. Have you heard of that
17 definition before, Professor Gruber?

18 A. I don't recall honestly.

19 Q. Okay.

20 (Document marked for
21 identification as Exhibit
22 Gruber-2.)

23 BY MR. GEISE:

24 Q. Professor Gruber, I'm

1 handing you what's marked as Exhibit 2 to
2 your deposition. And this is entitled on
3 the front, "Pain Management and the
4 Opioid Epidemic: Balancing Societal and
5 Individual Benefits and Risk of
6 Prescription Opioid Use."

7 Do you see that?

8 A. Yes, I do.

9 Q. And are you familiar with
10 this document?

11 A. Yes, I am.

12 Q. If I can ask you to turn to
13 Page 226 of Exhibit 2.

14 MR. KO: And just so the
15 record is clear, it appears that
16 Exhibit 2 is just portions of this
17 study.

18 MR. GEISE: You're correct,
19 Counsel.

20 BY MR. GEISE:

21 Q. It's just segments of the
22 report. It's not the entire publication.

23 A. Okay.

24 Q. If you look at Page 226, do

1 you see there's a section entitled
2 "Summary and Recommendation"?

3 A. Yes.

4 Q. And if you look, beginning
5 at the second sentence in that paragraph
6 it reads, "The products they supply
7 include opioids prescribed, dispensed,
8 and used by patients as medically
9 intended; those prepared as a
10 prescription, but not used as intended,
11 including opioids dispensed and misused;
12 as well as those that are diverted before
13 being dispensed, i.e., diverted from
14 lawful channels of commercial
15 distribution, such as wholesalers and
16 pharmacies; and those provided by drug
17 trafficking organizations, mostly from
18 international sources."

19 Do you see that?

20 A. Yes, I do.

21 Q. Does that refresh your
22 recollection in terms of the definition
23 that the National Academy of Science uses
24 for diversion?

1 MR. KO: Same. Object to
2 the form.

3 THE WITNESS: I don't know
4 that they declared a formal
5 definition. But certainly that's
6 the definition that they seem to
7 use in this report.

8 BY MR. GEISE:

9 Q. Is that definition that they
10 use in that report one that is commonly
11 used in academic papers that discuss the
12 diversion of controlled substances?

13 MR. KO: If you know.

14 BY MR. GEISE:

15 Q. If you know.

16 A. I guess I don't -- yeah,
17 certainly -- yeah, I don't know for sure.

18 Q. Using the word "diversion"
19 as it's defined in Exhibit 2 by NAS, are
20 you offering an opinion about whether any
21 of the defendants in this case failed to
22 maintain effective controls against
23 diversion?

24 A. No, I'm not.

1 Q. If I can turn your attention
2 to Paragraphs 23 and 24 of your report.

3 In Paragraph 23 and 24 you
4 discuss changes in physicians' approaches
5 to pain management over time and cite to
6 another expert, Dr. Courtright's, report,
7 correct?

8 A. That's correct.

9 Q. Did you have meetings with
10 Dr. Courtright while you were preparing
11 your report?

12 A. No, I did not.

13 Q. Without asking you if you
14 learned of the contents of
15 Dr. Courtright's report from counsel, did
16 you see any draft of Dr. Courtright's
17 report while you were preparing your
18 report?

19 A. No, I did not.

20 Q. Have you ever talked with
21 Dr. Courtright about his report and his
22 opinions?

23 A. No, I have not.

24 Q. Do you intend to offer an

1 independent opinion on the subject matter
2 in Dr. Courtright's report, being changes
3 in physicians' approaches?

4 MR. KO: Object to the form.

5 THE WITNESS: No, I don't.

6 BY MR. GEISE:

7 Q. If you look at Paragraph 25,
8 you refer to another expert, Matthew
9 Perri.

10 Do you see that?

11 A. Yes, I do.

12 Q. Did you have any discussions
13 with Matthew Perri while you were forming
14 your report?

15 A. No, I did not.

16 Q. Is your exposure to what his
17 opinions were going to be similar to your
18 exposure to Dr. Courtright's, in that you
19 had a draft of his report or were told
20 about it?

21 A. I don't understand the
22 question.

23 Q. It's a terrible question.
24 I'm glad you don't understand it.

1 Let me ask you, did you see
2 a draft of Matthew Perri's report while
3 you were preparing your report?

4 A. No, I didn't.

5 Q. It was information that was
6 conveyed to you about what his report
7 would cover?

8 A. Yes.

9 Q. And do you intend to offer
10 an independent opinion on the subject
11 matter in Perri's report about the
12 marketing of opioids for pain management?

13 MR. KO: Object to the form.

14 THE WITNESS: No, I don't.

15 BY MR. GEISE:

16 Q. If you look at Paragraph 26
17 of your report, in it you discuss changes
18 in medical policies to encourage more
19 active pain management, and specifically
20 you mentioned the Veterans Administration
21 mandate to assess pain as the fifth vital
22 sign.

23 Do you see that?

24 A. Yes.

1 MR. KO: There is a lot more
2 to that paragraph.

3 BY MR. GEISE:

4 Q. There is a lot more to it.
5 Do you agree that it's included in the
6 paragraph?

7 A. Yes, I do.

8 Q. In the last sentence of
9 Paragraph 26, you write, "This followed
10 the Veterans Administration's
11 implementation of a mandate to assess
12 pain as the fifth vital sign in 2000,
13 including the use of 0 to 10-point
14 numerical rating scale."

15 Do you see that?

16 A. Yes, I do.

17 Q. And we talked in Paragraph
18 20 and 22 of your report about the length
19 of time that the addictive potential for
20 opioids has been established in the
21 medical literature and the length of time
22 that opioids have been used to treat
23 pain. Do you recall that?

24 A. Yes, I do.

1 Q. Okay. The Veterans
2 Administration implemented their mandate
3 in 2000 with knowledge that opioids had
4 long been used to treat pain and had long
5 been abused, leading to addiction and
6 death, correct?

7 MR. KO: Object to the form.

8 THE WITNESS: I don't know
9 what knowledge they had.

10 MR. GEISE: We've been going
11 a little over an hour. Why don't
12 we take a quick break.

13 THE WITNESS: Yeah, sure.

14 THE VIDEOGRAPHER: The time
15 is 11:16 a.m. We are off the
16 record.

17 (Short break.)

18 THE VIDEOGRAPHER: The time
19 is 11:31 a.m., and we're on the
20 record.

21 (Document marked for
22 identification as Exhibit
23 Gruber-3.)

24 BY MR. GEISE:

1 Q. Professor Gruber, I'm
2 handing you an excerpt from the book
3 Public Finance and Public Policy that you
4 might recognize since you wrote it.

5 Do you see that?

6 A. Yes, I do.

7 Q. And this is not the entire
8 book. This is just an excerpt. I want
9 to ask you about some specific passages
10 in your book. First, if I can turn your
11 attention to Page 66.

12 MR. KO: This is Exhibit 3?

13 MR. GEISE: It is Exhibit 3.

14 Yes.

15 THE WITNESS: Okay.

16 BY MR. GEISE:

17 Q. At the top of Page 66, you
18 write, "In this chapter, we review these
19 empirical methods and encounter the
20 fundamental issue faced by those doing
21 empirical work in economics,
22 disentangling causality from
23 correlation."

24 Do you see that?

1 A. Yes, I do.

2 Q. And is it your opinion that
3 this is a fundamental issue faced by
4 those doing empirical work in economics?

5 A. Yes, it is.

6 Q. That paragraph continues,
7 "We say that two economic variables are
8 correlated if they move together, but
9 this relationship is causal only if one
10 of the variables causes the movement in
11 the other."

12 Do you see that?

13 A. Yes, I do.

14 Q. You continue, "If instead
15 there is a third factor that causes both
16 to move together, the correlation is not
17 causal."

18 Do you see that?

19 A. Yes, I do.

20 Q. Do you agree that there is a
21 difference between correlation and
22 causation?

23 A. Yes, I do. That's what we
24 just covered.

1 Q. You agree that correlation
2 does not equal causation, correct?

3 A. That's -- once again, that's
4 what we just -- yeah, that's what's in
5 the paragraph.

6 Q. And next to the paragraph in
7 the margin you have two highlighted
8 terms. First you have "correlated" and
9 you write, "Two economic values are
10 correlated if they move together."

11 And causal, "Two economic
12 variables are causally related if the
13 movement of one causes movement of the
14 other."

15 Do you see that?

16 A. Yes, I do.

17 Q. And that basically repeats
18 what you have in the substance of the
19 paragraph, correct?

20 A. That's correct.

21 Q. And you agree that the
22 distinction between correlation and
23 causality is an important distinction,
24 correct?

1 A. Yes, I do.

2 Q. In fact, that's the title of
3 Section 3.1 of your book, "The important
4 distinction between correlation and
5 causality," right?

6 A. Yes.

7 Q. I want to also draw your
8 attention to a cartoon that is included
9 on Page 66 of your book in the lower
10 left-hand corner.

11 Do you see that?

12 A. Yes, I do.

13 Q. Professor Gruber, did you
14 select this cartoon to be included in
15 your book?

16 A. Yes, I did.

17 Q. And the cartoon depicts a
18 man sitting at a desk and another man
19 standing next to the desk, and the
20 caption is, "That'S the gist of what I
21 want to say, now get me some statistics
22 to base it on."

23 Do you see that?

24 A. Yes, I do.

1 Q. Why did you include this
2 cartoon in your book?

3 A. I'm trying to -- in my
4 textbook, I'm trying to find ways to get
5 students to understand and remember
6 important empirical concepts. The
7 cartoons are not to be definitional or
8 dispositive. But rather to get them to
9 sort of have some graphical associations
10 with thinking about the important issues
11 in the book.

12 Q. What association do you want
13 the students to take away from this
14 particular cartoon?

15 A. From this cartoon I want
16 them to take away the distinction that
17 just having data about something does not
18 imply causation.

19 Q. And similarly, correlation
20 does not equal causation, correct?

21 MR. KO: Objection. Asked
22 and answered.

23 THE WITNESS: That's
24 correct.

1 BY MR. GEISE:

2 Q. I want to direct your
3 attention to the next page of your book.
4 You see there's a heading, "The Problem"?

5 A. Yes, I do.

6 Q. You write in the first
7 sentence, "In all of these examples, the
8 analysis suffered from a common problem:
9 The attempt to interpret a correlation as
10 a causal relationship without sufficient
11 thought to the underlying process
12 generating the data."

13 Do you see that?

14 A. Yes, I do.

15 Q. And do you agree that
16 correlation should not be interpreted as
17 a causal relationship without analysis of
18 the underlying process generating the
19 data?

20 A. Yes, I do.

21 Q. If you look at the last
22 sentence of that paragraph on Page 67,
23 you write, "Once the data are available
24 on any two measures, it is easy to see

1 whether or not they move together, a
2 characteristic we call being correlated."

3 Do you see that?

4 A. Yes, I do.

5 Q. You continue, "What is
6 harder to assess is whether the movements
7 in one measure are causing the movements
8 in the other."

9 Do you see that?

10 A. Yes, I do.

11 Q. And then you continue, "For
12 any correlation between two variables, A
13 and B, there are three possible
14 explanations, one or more of which could
15 result in the correlation: A causes B, B
16 causes A, some third factor causes both."

17 Do you agree with that?

18 A. Yes, that's what I wrote.

19 Q. And on the next page you
20 also wrote in the first sentence of the
21 last paragraph, in Section 3.1, "The
22 general problem that empirical economists
23 face in trying to use existing data to
24 assess the causal influence of one factor

1 on another, is that one cannot
2 immediately go from correlation to
3 causation. This is a problem for policy
4 purposes because what matters most is
5 causation. Policymakers typically want
6 to use the results of empirical studies
7 as a basis for predicting how government
8 interventions will affect behaviors.
9 Knowing that two factors are correlated
10 provides no predictive power; prediction
11 requires understanding the causal links
12 between the factors."

13 Do you see that?

14 A. Yes, I do.

15 Q. Now, in the context of your
16 book, are you using the term "factors" to
17 mean the same as a variable?

18 A. That would be another word
19 for typically what's used in economic
20 studies.

21 Q. You are familiar with the
22 term "dependent variable"?

23 A. Yes, I am.

24 Q. How would you define that

1 term?

2 A. In a statistical analysis,
3 generally you're trying to use certain
4 factors or variables to explain a
5 phenomenon. The phenomenon you're trying
6 to explain is the dependent variable.

7 Q. And a dependent variable is
8 one that is explained by other variables.
9 Is that accurate?

10 A. The -- the dependent
11 variable is dependent on a set of what we
12 typically call independent variables
13 that -- that explain in part or in whole
14 the movement of the dependent variable.

15 Q. And a definition then of an
16 independent variable would be one that
17 explains in part or in whole the movement
18 of the dependent variable?

19 MR. KO: Object to the form.

20 THE WITNESS: The -- the
21 definition of an independent
22 variable would be one that can be
23 hypothesized to explain in part or
24 in whole the movement of the

1 dependent variable.

2 BY MR. GEISE:

3 Q. You can have more than one
4 independent variable that influences a
5 dependent variable, correct?

6 A. That's correct.

7 Q. Are there statistical tools
8 that can help an economist identify
9 whether the correlation between two or
10 more variables represents a causal
11 relationship?

12 A. Yes, there are.

13 Q. Is regression analysis one
14 of those statistical tools?

15 A. Yes, it is.

16 Q. What is regression analysis?

17 A. Regression analysis
18 generally forms the statistical
19 methodology of trying to establish a
20 core -- a relationship between a set of
21 independent variables and a dependent
22 variable.

23 Q. Are regressions then used to
24 quantify the relationship between the

1 variables?

2 A. Typically in economics, we
3 are using a regression framework to try
4 to quantify relationship between some
5 independent variables. Sometimes we're
6 using it to simply establish the sign of
7 that relationship. Sometimes
8 quantification is not as important as
9 establishing the sign. Sometimes it's to
10 quantify it.

11 Q. As part of that
12 quantification, do regressions also allow
13 you to identify how close and well
14 determined the relationship between the
15 variables is?

16 MR. KO: Object to the form.

17 THE WITNESS: The goal of
18 regression analysis typically is
19 to try to understand the nature of
20 that relationship. Close is not
21 really the term we'd use. But
22 it's the -- to try to understand
23 the nature of the relationship
24 between a set of independent

1 variables and dependent variable.

2 BY MR. GEISE:

3 Q. When you say the nature of
4 the relationship, are you also looking to
5 determine the strength of that
6 relationship?

7 MR. KO: Object to the form.

8 THE WITNESS: That is
9 generally the goal of a regression
10 analysis, yes.

11 BY MR. GEISE:

12 Q. Professor Gruber, are you
13 familiar with the term "omitted variable
14 bias"?

15 A. Yes, I am.

16 Q. How do you understand that
17 term to be defined?

18 A. You think of the three
19 separate words. Omitted means it's --
20 there's a factor that's not included in
21 the model. The factor -- or variable.
22 Omitted variable is something which is
23 not included in the model. The bias
24 arises because if that omitted fact

1 variable is not included in the model,
2 both is correlated with the dependent
3 variable and correlated with the
4 independent variables that are the focus
5 of your study. It can cause the
6 relationship that you estimate between
7 the dependent and independent variables,
8 to be not -- to be a bias that is not the
9 best predictor of the effect of that
10 independent variable on the dependent
11 variable.

12 Q. If an analysis suffers from
13 omitted variable bias either in the
14 correlation with the dependent variable
15 or -- and/or the correlation with the
16 independent variable, does it cause the
17 conclusion from that analysis to be less
18 reliable?

19 MR. KO: Object to the form.

20 THE WITNESS: "Reliable" is
21 not a term that I understand.

22 BY MR. GEISE:

23 Q. Okay. Does it cause the
24 analysis to be less proven?

1 MR. KO: Object to the form.

2 THE WITNESS: Once again, I
3 don't really know how to think
4 about that term.

5 BY MR. GEISE:

6 Q. Well, do you characterize
7 the strength of a relationship when you
8 perform the regression analysis?

9 MR. KO: Object to the form.

10 THE WITNESS: You're using
11 terms that I really wouldn't use
12 in studies. I don't know how to
13 quite interpret them.

14 BY MR. GEISE:

15 Q. Well, if the omitted
16 variable causes a bias in the analysis,
17 would that cause the resulting regression
18 coefficients to be biased as well?

19 A. Let me go back to the
20 definition of omitted variable bias. If
21 there is a variable that is excluded from
22 the model that's correlated with the
23 dependent variable, and it's also
24 correlated with one or more of the

1 independent variables in the model, then
2 that will cause those coefficients of
3 those independent variables to deviate
4 from the best linear predictor, which is
5 what regression is trying to get you.

6 Q. And that would be a weakness
7 of that analysis, correct?

8 MR. KO: Object to the form.

9 THE WITNESS: Once again,
10 you have to say relative to what.

11 BY MR. GEISE:

12 Q. Well, obviously if you
13 included the variable instead of omitted
14 the variable, it would be a stronger
15 analysis, because you would take account
16 of that variable that has an impact on
17 both the dependent and independent
18 variables?

19 MR. KO: Object to the form.

20 THE WITNESS: Not
21 necessarily.

22 BY MR. GEISE:

23 Q. Okay. Do you agree that
24 omitted variable bias can cause a

1 misattribution of the effect of the
2 variables?

3 MR. KO: Object to the form.

4 THE WITNESS: Omitted
5 variable bias -- I'd like to stick
6 with the technical definition.
7 Omitted variable bias can, under
8 certain conditions, cause the
9 coefficients that you estimate in
10 other variables to deviate from
11 their best -- their best linear
12 prediction of the dependent
13 variable.

14 BY MR. GEISE:

15 Q. I want to ask you to look at
16 Page 58 of your report, and in particular
17 Footnote 97. For purposes of your
18 report, looking at the third line of
19 Footnote 97, you said, "As noted, I used
20 shipments of prescription opioids as a
21 proxy for consumption in an area."

22 Do you see that?

23 A. Yes, I do.

24 Q. Is it accurate to say that

1 you did not use actual consumption for
2 your analysis in this case?

3 MR. KO: Object to the form.

4 THE WITNESS: That is
5 accurate.

6 BY MR. GEISE:

7 Q. And you did not use
8 prescriptions for purposes of your
9 analysis in this case?

10 MR. KO: Object to the form.

11 THE WITNESS: I, at various
12 points -- I can't -- I can't
13 recall whether prescriptions was
14 used in the analysis at some
15 point. But in this case I'm
16 talking about using shipments.

17 BY MR. GEISE:

18 Q. And throughout your report,
19 you use shipments as a proxy for
20 consumption, correct?

21 A. Yes.

22 Q. Did you attempt to use
23 consumption for part of your analysis?

24 MR. KO: Object to the form.

1 THE WITNESS: I don't recall
2 the entire process.

3 BY MR. GEISE:

4 Q. Did you want to use
5 consumption for purposes of your
6 analysis?

7 MR. KO: Same objection.

8 THE WITNESS: What we would
9 ideally like to use is the best
10 measure of use/misuse of
11 opioids -- use and misuse of
12 opioids in a specific location.

13 Whether we'd want to use
14 consumption would depend on how
15 precisely consumption was measured
16 relative to shipments.

17 BY MR. GEISE:

18 Q. When you write that you use
19 shipments as a proxy for consumption,
20 that leads me to understand that you
21 wanted to use consumption but weren't
22 able to, and then you used shipments as a
23 proxy; is that incorrect?

24 MR. KO: Object to the form.

1 THE WITNESS: The -- we
2 would like to use a measure of
3 prescription opioid use in a
4 county.

5 Consumption would mean
6 broadly, meaning prescription
7 opioid use. That is not measured
8 well in many contexts. So we use
9 prescriptions -- we use shipments
10 as a proxy.

11 BY MR. GEISE:

12 Q. If you had it available,
13 would you have preferred to use
14 consumption as opposed to shipments as a
15 proxy for consumption?

16 MR. KO: Object to the form.

17 THE WITNESS: It would
18 depend how it was measured, how
19 well it was measured, things like
20 that.

21 BY MR. GEISE:

22 Q. When you and Professor
23 Cutler and Professor McGuire initially
24 sat down to look at the landscape of

1 where your analysis would go, was there a
2 suggestion at the beginning to use
3 consumption numbers for purposes of your
4 analysis?

5 MR. KO: I'd give you the
6 same instruction that I gave
7 previously. To the extent that
8 these discussions were with
9 counsel, I'd advise you actually
10 not to answer regarding any of the
11 substance or the contents of those
12 communications.

13 THE WITNESS: We discussed a
14 large variety of issues about how
15 to set up the analysis. And
16 certainly one of the things -- the
17 issue was how we'd measure the
18 opioid use.

19 BY MR. GEISE:

20 Q. Did the three of you discuss
21 whether consumption data was available
22 for purposes of your analysis?

23 MR. KO: Object to the form.
24 And also the same instruction that

1 I gave previously.

2 THE WITNESS: I once again
3 would just say broadly we
4 discussed how we were going to
5 measure these things.

6 BY MR. GEISE:

7 Q. Were you requested for
8 purposes of your analysis to use
9 shipments as a proxy for consumption?

10 A. No.

11 Q. I'm going to ask you to turn
12 to Paragraph 72 in your expert report.
13 You see this is the first paragraph in
14 Roman Numeral IV, entitled "Impact of
15 Shipments on Opioid Dependence."

16 Do you see that?

17 A. Yes, I do.

18 Q. And directing your attention
19 to the first sentence in that paragraph,
20 you write, "In this section and the next,
21 I show that the increases in shipments of
22 prescription opioids was a direct and
23 substantial cause of the rapid growth in
24 mortality for both licit and illicit

1 opioid-related mortality in the past
2 20 years."

3 Do you see that?

4 A. Yes, I do.

5 Q. Now, for purposes of your
6 analysis, are shipments your independent
7 variable?

8 A. Yes. Okay. Well, let me
9 clarify that answer. Shipments are one
10 of the set of independent variables that
11 we look at.

12 Q. What other independent
13 variables did you look at for part of
14 your analysis?

15 A. Well, as you can see later
16 in the report, I looked at measures of
17 demographics in the county, measures of
18 economic activity, and measures of
19 non-opioid mortality.

20 Q. We'll talk about those other
21 variables in a moment. But are there any
22 other variables in addition to the
23 demographics, economics activity, and
24 non-opioid mortality that you looked at?

1 A. I don't think so.

2 Q. Specifically with respect to
3 your opinion in Paragraph 72 that there
4 is a direct and substantial -- that
5 shipments of prescription opioids was a
6 direct and substantial cause of the rapid
7 growth in mortality for both licit and
8 illicit opioid-related mortality, are you
9 attributing responsibility for increases
10 in shipments to conduct by any of the
11 individual entities in this lawsuit?

12 MR. KO: Object to the form.

13 THE WITNESS: I'm
14 attributing this to the
15 consequence of the behavior of a
16 variety of entities who are
17 defendants in this lawsuit.

18 BY MR. GEISE:

19 Q. But you have not attributed
20 responsibility to a specific defendant in
21 this lawsuit, correct?

22 A. That is correct.

23 MR. KO: Object -- object to
24 the form. Objection, asked and

1 answered.

2 BY MR. GEISE:

3 Q. Your opinion in Paragraph 72
4 is based on shipments in the aggregate;
5 is that correct?

6 MR. KO: Objection. Asked
7 and answered.

8 THE WITNESS: That is
9 correct.

10 MR. KO: Actually I
11 apologize to you. I didn't see
12 that you asked about Paragraph 72.

13 BY MR. GEISE:

14 Q. Professor Gruber, if a
15 defendant in this case was dismissed,
16 would your opinion set forth in
17 Paragraph 72 change at all?

18 A. I haven't really focused on
19 that. I don't know.

20 Q. So the removal of a
21 defendant or a group of defendants from
22 this case would not impact your opinion
23 in Paragraph 72; is that correct?

24 MR. KO: Object to the form.

1 THE WITNESS: I didn't say
2 that. I said I don't know.

3 BY MR. GEISE:

4 Q. Well, can you tell me if you
5 have an opinion with respect to a
6 specific defendant as it relates to your
7 opinion in Paragraph 72?

8 A. As we discussed, my opinion
9 in Paragraph 72 is about the relationship
10 between aggregate shipments and outcomes.

11 I've not formed any
12 opinions -- opinions with respect to a
13 specific defendant.

14 Q. So, I think we established
15 before that you don't know if there are
16 other entities who contributed to
17 shipments that aren't part of this
18 lawsuit, correct?

19 MR. KO: Object to the form.

20 THE WITNESS: I -- can
21 you -- can you ask again? I don't
22 quite understand.

23 BY MR. GEISE:

24 Q. Sure. You don't -- you're

1 looking at shipments in the aggregate,
2 correct?

3 A. That's correct.

4 Q. You do not know if the
5 defendants in this lawsuit are
6 responsible for that full aggregate of
7 shipments, correct?

8 A. That's correct.

9 Q. So if a defendant were not
10 in the case, current defendant is
11 dismissed, say, would that change the
12 opinion, or is your opinion still based
13 on the aggregate regardless of the
14 underlying individual defendants?

15 MR. KO: Object to the form.

16 THE WITNESS: I just, I
17 haven't really worked that out. I
18 don't know.

19 BY MR. GEISE:

20 Q. And if you haven't worked it
21 out, you couldn't answer questions about
22 that today, correct?

23 MR. KO: Object to the form.

24 THE WITNESS: That's

1 correct.

2 BY MR. GEISE:

3 Q. Continuing in Paragraph 72,
4 you write, "The relationship between the
5 rapid rise in prescription opioid
6 shipments and the increase in
7 opioid-related mortality since the mid
8 1990s is readily apparent when comparing
9 differences across geographic areas and
10 opioid shipments received between 1997 to
11 2010 and the growth of opioid dependence
12 and mortality."

13 Do you see that?

14 A. Yes, I do.

15 Q. And then you continue by
16 saying your discussion here identifies
17 and illustrates these major trends,
18 right?

19 A. That's what it says, yes.

20 Q. Now, according to the layout
21 in your textbook that we looked at
22 earlier, a correlation between increasing
23 opioid shipments and increasing opioid
24 mortality could have three possible

1 explanations, correct?

2 MR. KO: Object to the form.

3 THE WITNESS: In general, in
4 theory there are three possible
5 relationships.

6 In this, A could cause B, B
7 could cause A, or there could be a
8 third variable causing both. It's
9 hard in this context to think
10 about how mortality would be
11 causing increased shipments. So
12 I'm not sure all three conditions
13 apply in this context.

14 BY MR. GEISE:

15 Q. So the -- A causing B here
16 would be increases in opioid shipments
17 caused the increase in opioid mortality,
18 correct?

19 A. That's correct.

20 Q. B here would be an increase
21 in opioid mortality caused an increase in
22 opioid shipments?

23 A. That would be with the
24 parallel.

1 Q. And then the third option is
2 that some other variable caused both the
3 increase in opioid shipments and the
4 increase in opioid mortality, correct?

5 A. Correct.

6 Q. Now, in your report, you
7 spend most of your time discussing that
8 first variable, that opioid shipments
9 cause the increase in opioid mortality,
10 correct?

11 MR. KO: Object to the form.

12 THE WITNESS: Your question,
13 I -- it's not a first variable. I
14 spend most of the time discussing
15 that first explanation.

16 BY MR. GEISE:

17 Q. Okay. Did you perform any
18 analysis with regard to the second two
19 options?

20 MR. KO: Object to the form.

21 THE WITNESS: I did not
22 perform analysis with regards to
23 higher mortality causing higher
24 prescriptions. That's

1 implausible.

2 I did perform a number of
3 analyses and considerations
4 regarding to the third possibility
5 that there's an omitted factor
6 causing both.

7 BY MR. GEISE:

8 Q. And those factors or
9 variables that you considered are the
10 ones you identified with the
11 demographics, the economic activity, and
12 non-opioid mortality?

13 A. The -- those are the three
14 things I considered. They are -- they
15 can represent, not only those three
16 things but they can represent testing
17 larger hypotheses as well. But those are
18 the three factors I considered.

19 Q. Let me direct your attention
20 to Paragraph 74 of your report.

21 In the first sentence you
22 write, "The extreme variation in per
23 capita shipments across areas suggest
24 that prescription activity which drives

1 shipments to an area bears little
2 relationship to medical need."

3 Do you see that?

4 A. Yes, I do.

5 Q. First of all, Professor
6 Gruber, what do you mean by the term
7 "prescription activity"?

8 A. I mean prescriptions of
9 opioids.

10 Q. Those would be prescriptions
11 issued by physicians and other
12 prescribers for opioids?

13 A. What I mean -- I think that
14 was inartfully expressed. What I mean to
15 say suggests that use of opioids -- yeah,
16 I agree with your question.

17 Q. And did you conduct any
18 research in this case of prescription
19 activity?

20 A. No, I did not.

21 Q. And I take it by that
22 answer, you didn't conduct any research
23 of prescription activity in Cuyahoga
24 County or Summit County?

1 A. No, I did not.

2 Q. Do you agree that
3 prescription activity can vary across
4 different areas?

5 A. Certainly.

6 Q. Do you agree that medical
7 need can vary across different areas?

8 MR. KO: Object to the form.

9 THE WITNESS: Yes, I agree
10 medical need can vary across
11 areas.

12 BY MR. GEISE:

13 Q. Do you have any opinion that
14 any of the individual defendants in this
15 case are responsible for prescription
16 activity in Cuyahoga or Summit County?

17 MR. KO: Object to the form.

18 THE WITNESS: That's not
19 something which I have an opinion.

20 BY MR. GEISE:

21 Q. In Paragraph 74, you
22 indicate that prescription activity,
23 which drives shipments to an area, bears
24 little relationship to medical need.

1 Do you see that?

2 A. I think it's important to
3 read the whole sentence. What I say,
4 that the data suggests that prescription
5 activity would drive shipments to the
6 area bears little relationship to medical
7 need.

8 Q. What do you mean by "little
9 relationship"?

10 A. What I mean is that it is
11 hard to conceive of there being so much
12 variation in the actual need for proper
13 use of opioids that would vary to such a
14 large degree across geographic areas.

15 Q. Where you say it is hard to
16 conceive, it is the case though that you
17 did not do any research into the
18 prescription activity in these areas,
19 correct?

20 MR. KO: Object to the form.

21 THE WITNESS: We used, as
22 you said repeatedly, shipments as
23 a proxy for opioid use in the
24 areas.

1 BY MR. GEISE:

2 Q. Understand. In Paragraph 74
3 of your report though, you state that the
4 variation in per capita shipments
5 suggests that prescription activity,
6 which drives shipments to an area, bears
7 little relationship to medical need.

8 Do you see that?

9 A. That's correct.

10 Q. And my question is, you did
11 not perform any analysis of that
12 prescription activity, correct?

13 A. That's correct.

14 Q. Similarly, you didn't
15 perform any analysis of medical need in
16 any particular area; is that correct?

17 MR. KO: Object to the form.

18 THE WITNESS: No, that's not
19 correct.

20 BY MR. GEISE:

21 Q. It's not? What did you do
22 to perform an analysis of medical need?

23 A. As we described in the
24 paper, we said that medical need is

1 primarily proxy by demographic factors.
2 And so for example, as I said here, for
3 example, a county with an older
4 population would be expected to have
5 greater demand for prescription pain
6 medications. Therefore, we -- I assessed
7 whether variation in demographic factors,
8 which we correlate with medical need, is
9 responsible for this wide variation we
10 see.

11 Q. Is it your opinion that
12 there is no correlation between medical
13 need and prescription activity?

14 MR. KO: Object to the form.

15 THE WITNESS: No. That's
16 not my opinion.

17 BY MR. GEISE:

18 Q. So you agree there is a
19 correlation between medical need and
20 prescription activity?

21 MR. KO: Same objection.

22 THE WITNESS: I have not
23 conducted a study of the
24 relationship between -- between

1 medical need and prescription
2 activity.

3 BY MR. GEISE:

4 Q. So in paragraph 74 of your
5 report, you say that you have -- you say
6 the prescription activity bears little
7 relationship to medical need. But you
8 haven't conducted a study of the
9 relationship between medical need and
10 prescription activity; is that correct?

11 MR. KO: Object to the form.

12 THE WITNESS: As I've said,
13 we use, as a proxy for medical
14 need, demographic characteristics,
15 and ask how much of this extreme
16 variation in shipments that we see
17 can be explained by this proxy for
18 medical need. And the answer is
19 very, very little.

20 BY MR. GEISE:

21 Q. So have you conducted a
22 study of the relationship between medical
23 need and prescription activity?

24 MR. KO: Objection. Asked

1 and answered.

2 THE WITNESS: Once again, we
3 have done -- medical need is a
4 term of -- it's not -- that's not
5 a strictly scientific definition
6 of medical need.

7 We've done -- as I said, we
8 have a proxy, which we think
9 should be closely associated with
10 medical need. And if it is true
11 that medical need drove this
12 extreme variation across counties,
13 then it would be true that when we
14 included this proxy, you would
15 typically expect that to explain a
16 significant part of the variation
17 across counties where in fact it
18 explains almost none.

19 BY MR. GEISE:

20 Q. Do you agree that medical
21 need in individual cases is determined by
22 physicians and prescribers with input
23 from their patients?

24 MR. KO: Object to the form.

1 Objection. Foundation.

2 THE WITNESS: I'm not in the
3 head of prescription provide --
4 no -- doctors. I don't know.

5 BY MR. GEISE:

6 Q. In terms of who makes the
7 individual decision as to medical need on
8 a patient, that would be the doctor,
9 correct?

10 MR. KO: Object to the form.
11 Objection. Foundation.

12 THE WITNESS: You know, once
13 again, I don't really know. I --
14 it's going to be some combination
15 of people, the doctor, and some
16 combination of some variety of
17 people ranging from the patient to
18 the set of people that doctor
19 interacts with. So I can't say
20 for sure.

21 BY MR. GEISE:

22 Q. How did you factor in
23 medical decisionmaking as part of your
24 proxy for determining medical need?

1 MR. KO: What do you mean?

2 Object to the form.

3 THE WITNESS: Yeah, I don't
4 really -- I'm just confused.

5 BY MR. GEISE:

6 Q. Well, in terms of who makes
7 the individual decision as to medical
8 need, you just told me that it was going
9 to be some combination of people, the
10 doctor and some variety of people ranging
11 from the patient and the people the
12 doctor interacts with. Do you recall
13 that testimony?

14 A. Yes, I do.

15 Q. Okay. So my question is,
16 how did you factor that environment as
17 part of your proxy for determining
18 medical need?

19 MR. KO: Object to the form.

20 THE WITNESS: Once again, I
21 don't claim to completely explain
22 the medical need for opioids
23 across counties. The argument
24 here is that a strong proxy for

1 medical need would be these
2 demographic factors. And common
3 arguments made in economics,
4 that's used in economic research,
5 is if you don't have an entire
6 variable, if you don't have the
7 variable you want but you have a
8 strong proxy for it, you'd like to
9 see if that proxy is correlated
10 with the dependent variable of
11 interest.

12 BY MR. GEISE:

13 Q. Is there an accepted
14 definition of the term "medical need" for
15 purposes of economic research?

16 A. No, there's not.

17 Q. Is that why you use the
18 proxy that you did, because there's no
19 defined term of "medical need"?

20 A. I used the proxy because
21 that was the best available data that I
22 thought would be representative of the
23 variation of medical need across areas.

24 Q. When we talk about the

1 process of the doctor making a
2 prescription decision for a patient, do
3 you agree that a prescription results
4 from the doctor either addressing the
5 perceived medical need, or a doctor
6 proceeding despite knows there is no
7 medical need?

8 MR. KO: Object to form.
9 Objection. Foundation.

10 THE WITNESS: I don't
11 understand the question.

12 BY MR. GEISE:

13 Q. Well, do you have a view as
14 to what percentage of prescriptions fall
15 into the category of addressing a medical
16 need of a patient?

17 MR. KO: Same two prior
18 objections.

19 THE WITNESS: No, I don't
20 have a view of that.

21 BY MR. GEISE:

22 Q. And similarly, you don't
23 know -- you don't have a view as to what
24 percentage of prescriptions do not

1 address a medical need of a patient?

2 MR. KO: Same two prior
3 objections.

4 THE WITNESS: It's the same
5 question. No, I don't.

6 BY MR. GEISE:

7 Q. In Paragraph 75 of your
8 report, you write in the first sentence,
9 "To evaluate the extent to which
10 variation and per capita shipments can be
11 explained by such factors, I use
12 regression analysis to evaluate the
13 relationship between the demographic and
14 economic characteristics of counties and
15 county-level shipments per capita in
16 2010. The analysis is based on a large
17 county sample."

18 Do you see that?

19 A. Yes, I do.

20 Q. Okay. And I believe you
21 mentioned the demographic and economic
22 characteristics are two of the
23 independent variables that you looked at
24 for performing your analysis, correct?

1 A. Well, there's more than two.
2 There's a series of variables that fall
3 into that category.

4 Q. I'm saying they are two of
5 the variables.

6 A. Well, no, there's -- there
7 are -- they're two of the categories of
8 variables. There's a variety of
9 variables within each category.

10 Q. Fair. And we'll look at
11 some of those.

12 You say your analysis is
13 based on the large county sample, right?
14 What do you mean by that?

15 A. So if we look at -- let me
16 get back to the section. Sorry, one
17 minute. I defined the large county
18 sample, I'm just trying to find the spot
19 where I do.

20 Yes, so I defined the large
21 county sample in Paragraph 36, which is
22 the 404 counties identified in the MCOB
23 data that have consistently available
24 data over the period from 1993 to 2016,

1 which includes the bellwether counties.
2 These are counties with roughly more than
3 100,000 in population.

4 Q. Now, do you know if the
5 large county data that you relied on
6 included private data?

7 MR. KO: Object to the form.

8 THE WITNESS: I don't know
9 for sure.

10 BY MR. GEISE:

11 Q. And when you use that data,
12 I think you told us before that you
13 didn't actually have any of the data
14 yourself to look at; is that correct?

15 MR. KO: Objection to form.

16 THE WITNESS: That's --
17 that's correct.

18 BY MR. GEISE:

19 Q. So your description where
20 you just identified in Paragraph 36 of
21 the -- the counties and the data that was
22 looked at, that was something that
23 Compass Lexecon did, not you
24 specifically, correct?

1 MR. KO: Object to the form.

2 THE WITNESS: I worked with
3 Compass Lexecon to guide their
4 analysis of the data. But I never
5 used the actual raw data. They
6 combined it into these counties.

7 BY MR. GEISE:

8 Q. Now, do you agree that there
9 could be other factors that affect both
10 medical need and shipments that you did
11 not take into account in your regression?

12 A. That's why I said that these
13 things were a proxy for medical need.

14 Q. If there are other factors
15 that affect both medical need and
16 shipments that you did not consider in
17 your regression, do you agree that your
18 regression would misrepresent the degree
19 to which variation in shipments can be
20 explained by medical need?

21 MR. KO: Object to the form.

22 THE WITNESS: It's certainly
23 possible. It's not certain.

24 BY MR. GEISE:

1 Q. If I could ask you to look
2 at Appendix 1-D to your report.

3 MR. KO: I'm sorry, Steve,
4 you said 1?

5 MR. GEISE: 1-D.

6 BY MR. GEISE:

7 Q. And this is -- the
8 Appendix 1-D is "Regression Estimates of
9 Demographic Variables."

10 Do you see that?

11 A. Yes, I do.

12 Q. And you used regression
13 analysis to evaluate the relationship
14 between the demographic and economic
15 characteristics of counties and shipments
16 in 2010, correct?

17 A. That's correct.

18 Q. Your regression analysis
19 only considered 2010, correct?

20 A. Yes. For this case, I just
21 used 2010.

22 Q. Did you run the same
23 analysis for other years to compare the
24 results to the results in 2010?

1 A. At various points in the
2 analysis we have run regressions like
3 this for very -- for different years.

4 Q. Why didn't you include that
5 in your appendix?

6 A. The appendix does not
7 include a conference of reporting of
8 every analysis that was done over the
9 last year. It includes what's relevant
10 to the report.

11 Q. And along the left-hand
12 column of Appendix 1-D you have a list of
13 different variables, correct?

14 A. Yes, that's correct.

15 Q. And is this what you were
16 referring to before, when I was -- I was
17 grouping the demographic and economic
18 activity as a variable that you had parts
19 underlying that specifically, correct?

20 MR. KO: Object to the form.

21 THE WITNESS: I don't know
22 what "parts" means.

23 BY MR. GEISE:

24 Q. Well, when I use the term

1 "demographic variable," you indicated
2 that there's more to it than just that.
3 And the more to it than just that are the
4 variables identified on Appendix 1-D,
5 correct?

6 MR. KO: Object to the form.

7 THE WITNESS: What I said is
8 this is not demographic variables,
9 it's a series of demographic
10 variables, and those are what's
11 included in -- in that -- in that
12 regression.

13 BY MR. GEISE:

14 Q. Correct. And the series of
15 demographic variables are those listed
16 along the left-hand column of
17 Appendix 1-D, right?

18 A. 1-D include -- lists a
19 series of demographic and economic
20 variables that are included in the
21 regression.

22 Q. So for instance, MMEs per
23 capita per day. Percent male in 2010.
24 Percent under 15 in 2010. So on and so

1 forth, correct?

2 A. No, that's not correct.

3 Q. You don't use those
4 variables?

5 A. No. But MMEs per capita per
6 day is the dependent variable.

7 Q. Okay. And then below that
8 are the independent variables that you
9 were testing, correct?

10 A. Yes.

11 Q. Okay. Now, you list a
12 number of -- of variables that you
13 tested. But there are a number that you
14 did not account for, correct?

15 MR. KO: Object to the form.

16 THE WITNESS: I don't
17 understand.

18 BY MR. GEISE:

19 Q. Well, did you account or
20 control for marital status?

21 A. No, that's not included.

22 Q. Did you account for number
23 of children?

24 A. No, it's not included.

1 Q. Did you account for single
2 parents?

3 A. We didn't include that
4 variable. A lot of the variables listing
5 will be highly correlated with other
6 variables that we did include. But that
7 specific variable wasn't included.

8 Q. You include the variable of
9 employment ratio, but you did not include
10 a variable for underemployment, correct?

11 A. I don't know what
12 underemployment means.

13 Q. Did you include a variable
14 for veterans?

15 A. No, we did not.

16 Q. Did you include a variable
17 for the number of doctors?

18 MR. KO: Object to the form.

19 THE WITNESS: No, that's --
20 that's not included.

21 BY MR. GEISE:

22 Q. Did you include a variable
23 for eligibility for Medicare Part D?

24 A. We included a variable about

1 the age distribution which would be
2 pretty highly correlated with eligibility
3 for Medicare Part D.

4 Q. But you didn't include
5 eligibility for Medicare Part D
6 specifically, correct?

7 MR. KO: Objection, asked
8 and answered.

9 THE WITNESS: Once again,
10 eligibility for Medicare Part D
11 will be very highly correlated for
12 the percent of the population
13 that's over 65 which is included.

14 BY MR. GEISE:

15 Q. But eligibility and --
16 and -- I'll move on.

17 Did you include eligibility
18 for employer-sponsored health insurance?

19 A. Once again, that would be
20 correlated with some of the variables we
21 included but we did not include that
22 variable specifically.

23 Q. You didn't include the
24 variable incidence of cancer, correct?

1 A. That is not included, no.

2 Q. Or mental health?

3 A. There's not a variable. I
4 don't know what mental health means.

5 Q. Well, did you include
6 anything for diagnoses of mental health
7 disorders?

8 A. No, we did not.

9 Q. Did you include access to
10 treatment for opioid use disorder?

11 A. No, we did not.

12 Q. Did you include life
13 expectancy?

14 A. Once again we included a
15 variety of demographic factors which
16 would be highly correlated with life
17 expectancy, but we did -- we did not
18 include that.

19 Q. Do you agree that these
20 variables could affect both medical need
21 for opioids and shipments of opioids?

22 MR. KO: Object to the form.

23 THE WITNESS: It's possible,
24 sure.

1 Once again, the main goal
2 here, as I said, we used these as
3 a proxy for medical need. The
4 goal here is to not develop a
5 comprehensive model of medical
6 need.

7 The goal here was to show
8 that including a variety of very
9 explanatory variables that have a
10 lot of power to explain medical
11 need doesn't really move the
12 needle in terms of explaining this
13 enormous variation across
14 counties.

15 BY MR. GEISE:

16 Q. So you agree that your goal
17 was not to develop a comprehensive
18 model -- model of medical need?

19 MR. KO: Object to the form.
20 Mischaracterizes testimony and the
21 report.

22 THE WITNESS: The goal of
23 our analysis was to develop a
24 model that, with the available

1 variables, could show clearly that
2 when a set of variables that are
3 correlated with medical need are
4 included, they do not explain
5 much, if anything, of this
6 enormous variation across the
7 counties in shipments.

8 BY MR. GEISE:

9 Q. When you speak in terms of
10 available variables, do you agree that
11 the list that we just walked through are
12 also variables that would have been
13 available for you?

14 MR. KO: Object to the form.

15 THE WITNESS: I don't know
16 for sure.

17 BY MR. GEISE:

18 Q. Certainly some of them would
19 be available, correct?

20 MR. KO: Object to the form.

21 THE WITNESS: That's true.

22 BY MR. GEISE:

23 Q. Professor Gruber, if you can
24 look at Paragraph 77 in your report. You

1 state, "In some, the wide variation in
2 daily per capita MMEs across counties
3 after controlling for differences in
4 demographic and economic characteristics,
5 indicates that many shipments were
6 excessive and unnecessary."

7 Do you see that?

8 A. Yes, I do.

9 Q. Does this opinion apply
10 across all of the counties that were
11 included in the large county study?

12 A. An analysis such as the one
13 we did here is an aggregate analysis.
14 Aggregate analyses explain the central
15 tendency in the sample. And that's what
16 I'm explaining. I'm explaining across --
17 this sample. This is the relationship
18 that we observed.

19 Q. And did you do anything to
20 observe the relationship specifically in
21 Cuyahoga and Summit compared to the other
22 counties?

23 MR. KO: Object to the form.

24 THE WITNESS: The analysis

1 here is to show there's wide
2 variation. You need multiple
3 observations to show wide
4 variation. It wouldn't really
5 make sense to use one or two
6 counties to illustrate this point.

7 BY MR. GEISE:

8 Q. Well, whether it would make
9 sense or not, did you do anything to try
10 to observe the relationship specifically
11 in Cuyahoga and Summit Counties?

12 MR. KO: Object to the form.
13 Asked and answered.

14 THE WITNESS: Cuyahoga and
15 Summit Counties are included in
16 the analysis. The goal of this
17 analysis is to use the breadth of
18 the data for the large counties to
19 show that it is implausible -- it
20 is very unlikely based on the
21 observation, based on the data,
22 based on this regression, that
23 medical need could be explaining
24 the enormous variation that we're

1 seeing across counties.

2 To do analysis like that,
3 you need multiple counties.

4 That's the definition of how you
5 do an analysis like that.

6 BY MR. GEISE:

7 Q. And your analysis and your
8 conclusion would be exactly the same for
9 all of the counties contained within the
10 studies; is that accurate?

11 MR. KO: Object to the form.

12 THE WITNESS: That's not
13 what I'm saying.

14 BY MR. GEISE:

15 Q. Okay.

16 A. What I'm saying is the goal
17 of an analysis like this is to explain a
18 central tendency in the data, to
19 illustrate a general point.

20 You cannot -- the statement
21 that I'm making here is that there's an
22 enormous variability across the counties
23 that cannot be explained by medical need.
24 That is not a statement that applies to

1 one unit of observation, like a county.

2 It's a statement that applies to central
3 tendency in the data.

4 Q. So your statement applies to
5 all of those counties, not just an
6 individual one; is that fair?

7 A. My statement applies to
8 that -- the central tendency in the set
9 of data.

10 Q. Okay. What do you mean when
11 you use the term that many shipments were
12 excessive and unnecessary?

13 A. What I mean by that is
14 that -- that essentially if the -- what I
15 mean by that in this context is that, if
16 the shipments were to address medical
17 needs, then they would -- we would see a
18 large share of that huge variation being
19 explained by the variables included in
20 the model, and we don't.

21 Q. So is your definition of
22 excessive and unnecessary dependent on
23 medical need?

24 MR. KO: Object to the form.

1 THE WITNESS: Yeah, I don't
2 quite understand.

3 BY MR. GEISE:

4 Q. Well, you're saying that if
5 the shipments were to address medical
6 needs, you would see a large share of
7 that huge variation being explained by
8 the variables that you included in the
9 model, and you don't.

10 So I guess my question is,
11 is the definition you use for excessive
12 and unnecessary, that it means that it's
13 more than and not necessary to medical
14 need?

15 MR. KO: Object to the form.

16 THE WITNESS: It means --
17 what I mean -- what I'm saying
18 here is that there are
19 shipments -- the enormous
20 variation of shipments across
21 counties goes beyond what would be
22 explained by medical need.

23 BY MR. GEISE:

24 Q. If we accept that

1 conclusion, does that also imply that
2 prescription activity went -- was
3 excessive and unnecessary compared to
4 medical need?

5 MR. KO: Object to the form.

6 THE WITNESS: What I'm
7 saying here is that use of
8 prescription opioids was excessive
9 and unnecessary relative to
10 medical need. There are different
11 terms that you can use to proxy
12 for that. But that writ large is
13 what I'm talking about here.

14 BY MR. GEISE:

15 Q. I think you said before that
16 you didn't conduct any analysis of
17 prescription activity in Cuyahoga or
18 Summit County, correct?

19 A. I did not. That's correct.

20 Q. So do you have an opinion
21 whether prescription activity in Cuyahoga
22 and Summit Counties was excessive and
23 unnecessary?

24 MR. KO: Object to the form.

1 THE WITNESS: I do not.

2 BY MR. GEISE:

3 Q. When your analysis
4 establishes, as you term it, an enormous
5 variability, that doesn't show that
6 shipments exceeded medical need for
7 Cuyahoga and Summit County though,
8 correct?

9 MR. KO: Object to the form.

10 THE WITNESS: As I've said,
11 what I'm trying to do is show you
12 that that's enormous variability
13 that can't be explained by medical
14 need as proxied by these
15 demographic and economic
16 variables.

17 BY MR. GEISE:

18 Q. Did you perform any analysis
19 to see if certain counties received fewer
20 shipments than medical need would
21 suggest?

22 MR. KO: Object to the form.

23 THE WITNESS: No, I did not.

24 BY MR. GEISE:

1 Q. Looking at Paragraph 78 of
2 your report, in your first sentence, you
3 wrote, "As these data imply, there are
4 wide differences across counties and the
5 growth of per capita shipments over time.
6 This is demonstrated further in Figure
7 1.16 below which compares high shipment
8 to low shipment areas."

9 Do you see that?

10 A. Yes, I do.

11 Q. And you used the comparison
12 for high shipment to low shipment
13 counties for several of your graphs and
14 analysis in your report, correct?

15 A. That's correct.

16 Q. Is it true that Cuyahoga
17 County is not in the group of counties in
18 the top 25 percent of shipments?

19 A. I believe that's true, yes.

20 Q. And is it also true that
21 Summit County is not in the group of
22 counties in the top 25 percent of
23 shipments, correct?

24 A. I believe that's true, yes.

1 Q. And is it true that Cuyahoga
2 County is not in the bottom 25 percent of
3 counties?

4 A. That's correct.

5 Q. And same for Summit County?

6 A. That's correct.

7 MR. KO: Just so the record
8 is clear, Steve, I assume that the
9 top 25 and bottom 25 percent that
10 you're referring to is as
11 Dr. Gruber describes it in his
12 report.

13 MR. GEISE: Correct. His
14 chart for bottom 25 percent of
15 shipments and top 25 percent of
16 shipments.

17 BY MR. GEISE:

18 Q. So you agree that in your
19 charts and figures that use the
20 demarcation of top 25 percent and bottom
21 25 percent that Cuyahoga and Summit
22 County actually are not part of those
23 families of the top and bottom quartile?

24 MR. KO: Object to the form.

1 THE WITNESS: The -- the
2 data that's included here, the --
3 so if we look at Figure 1.16, the
4 orange and blue lines do not
5 include Cuyahoga and Summit.

6 The reason that the -- these
7 figures are constructed is to
8 demonstrate for the -- as a
9 general tendency in the data, the
10 relationship -- the -- the fact
11 that shipments grew much faster in
12 some areas of the country than in
13 others.

14 BY MR. GEISE:

15 Q. Did you perform the analysis
16 and create a chart for the second
17 quartile of counties that are in that
18 second 25 percent of shipments?

19 A. No, I did not.

20 MR. KO: Object to the form.

21 BY MR. GEISE:

22 Q. Did you perform the analysis
23 for the counties in the third quartile?

24 A. As I describe in the report,

1 there -- since shipments is, as they
2 described, only a proxy for opioid use,
3 we decided the clearest way to make the
4 comparison was to show the very high
5 shipment and the very low shipment
6 places.

7 If you want to look at a --
8 at an analysis that's county by county,
9 that's what Professor Cutler's regression
10 analysis does. This is to show clearly
11 and transparently the relationship
12 between places that were high shipment
13 and low shipment places and the resulting
14 outcomes.

15 Q. Do you agree that your
16 depiction of the difference between high
17 shipment and low shipment outcomes does
18 not specifically apply to Cuyahoga and
19 Summit Counties?

20 MR. KO: Object to the form.
21 Mischaracterizes.

22 THE WITNESS: No, I don't
23 agree with that.

24 BY MR. GEISE:

1 Q. Okay. Do you agree that
2 Cuyahoga and Summit Counties would not be
3 included in the red line on Figure 1.16
4 for the top 25 percent shipments?

5 A. Yes, I agree.

6 Q. And you agree that they
7 would not be included in the blue line at
8 Figure 1.16 for the bottom 25 percent of
9 shipments?

10 A. Yes, I agree.

11 Q. Their category is not
12 depicted in this figure, correct?

13 A. That's correct.

14 Q. If I could ask you to look
15 at Section B of your report that begins
16 on Page 55 and covers Paragraphs 79, 80
17 and 81, and direct your attention to the
18 last sentence in Paragraph 79 where you
19 write, "Nonetheless, data are available
20 that can be used to compare OUD" -- which
21 is opioid use disorder?

22 A. Correct.

23 Q. -- "as measured from NSDUH
24 data in states with higher and lower

1 levels of prescription opioid shipments."

2 Do you see that?

3 A. Yes.

4 Q. And NSDUH is the National
5 Survey on Drug Use and Health, correct?

6 A. I don't recall the exact
7 title of the survey. I've used the
8 acronym so many times. I don't
9 believe it's -- I don't know if it's
10 health or households. I know what -- I
11 don't know what the last H stands for.

12 Q. Okay. Let me ask you.

13 In Section B of your report
14 that begins on Page 55, are you analyzing
15 any relationship between shipments as the
16 independent variable and opioid use
17 disorder as the dependent variable?

18 A. Ask the question again, I'm
19 sorry.

20 Q. Yeah. In Section B, it's --
21 it's titled, "Self-Reported OUD is higher
22 in areas with greater shipments."

23 Do you see that heading?

24 A. Yeah.

1 Q. But I'm asking, did you
2 analyze any relationship between
3 shipments as the independent variable and
4 opioid use disorder as the dependent
5 variable?

6 MR. KO: In this report as a
7 whole or in this specific
8 paragraph?

9 MR. GEISE: In the report as
10 a whole.

11 THE WITNESS: In this report
12 as a whole, once again what we're
13 doing here is, this is
14 illustrating in a clear and
15 transparent way that when you
16 divide the independent variable
17 into high and low shipment areas,
18 that there is a significant
19 difference in the value of the
20 dependent variable. And that's
21 what I'm trying to illustrate in
22 this Figure 1.17.

23 BY MR. GEISE:

24 Q. What you're illustrating in

1 Figure 1.17, is that more accurately
2 described as a correlation as opposed to
3 causation?

4 MR. KO: Object to the form.

5 THE WITNESS: This is
6 described as an illustration of a
7 relationship that is -- this is an
8 illustration of a relationship
9 that is consistent with hypothesis
10 I lay out in the data, in the
11 report.

12 BY MR. GEISE:

13 Q. And while it's consistent
14 with your hypothesis, contained within
15 your report or the appendix, is not a
16 data analysis to prove a relationship
17 between the two, correct?

18 MR. KO: Object to the form.

19 THE WITNESS: That is
20 correct.

21 BY MR. GEISE:

22 Q. Looking again at
23 Paragraph 79 of your report. In the --
24 the second sentence, you say, "As

1 discussed above, others have noted that
2 these data substantially understate the
3 use of opioids and other drugs and that
4 changes in definitions complicate
5 historical comparison using these data."

6 Do you see that?

7 A. Yes, I do.

8 Q. And does that refer to the
9 NSDUH survey data on the self-reported
10 use of opioids?

11 A. Yes, that's correct.

12 Q. Do you believe that this is
13 a possible data limitation based on that
14 reporting?

15 A. As I've said, as I lay out
16 very clearly earlier in the report, the
17 reason that we focus this report mostly
18 on mortality as an outcome is because we
19 think there are limitations with the
20 NSDUH measure of -- of opioid use
21 disorder.

22 Q. Do you also think that NSDUH
23 has understated the use of heroin
24 throughout the years?

1 A. I haven't looked at the
2 NSDUH over time. There were changes in
3 definition. But at a point in time for
4 the reasons that we lay out, that NSDUH
5 understates the use of prescription
6 opioids, it -- those same reasons, many
7 of them would apply to understating the
8 use of heroin and other illicit
9 substances.

10 Q. Well, doesn't the literature
11 also talk about there's a greater
12 likelihood of -- of understating the use
13 of illicit substances compared to the use
14 of licit substances?

15 MR. KO: Object to the form.

16 THE WITNESS: I have --
17 in -- in the studies I've looked
18 at, that tends to be the general
19 tendency, although I don't know
20 the extent to which it applies to
21 a particular drug by drug. But
22 that certainly is the general
23 tendency in the studies I've
24 looked at.

1 BY MR. GEISE:

2 Q. Similar to Figure 1.16 on
3 Page 55 of your report, figure 1.17 on
4 Page 56, again looks at those counties
5 that have the top 25 percent and the
6 bottom 25 percent of shipments, correct?

7 A. That's correct.

8 Q. And just as it was true with
9 Figure 1.16, Cuyahoga and Summit County
10 do not fall within either of these two
11 categories depicted in Figure 1.17,
12 correct?

13 A. That's correct.

14 Q. Now, with regard to
15 Figure 1.17 and the percentage, we have
16 the average NSDUH 2015-2016 opioid use
17 disorder rate. Is that percentage based
18 on -- is it per capita, do you know?

19 MR. KO: Object to the form.

20 THE WITNESS: In the
21 appendix, Appendix 1-C, I've
22 carefully gone through with --
23 carefully -- I've tried to as
24 carefully as possible go through

1 and lay out exactly what's in each
2 figure. And if you look at the
3 appendix Figure 1.17, we say, "The
4 OUD rate is the percent of NSDUH
5 survey respondents age 12 or over
6 who report having experienced OUD
7 in the past 12 months."

8 BY MR. GEISE:

9 Q. So the percentage are based
10 on the percentage who have used -- is it
11 based on the percentage that have used
12 prescription opioids in the last
13 12 months or those who have reported
14 experiencing opioid use disorder in the
15 past 12 months?

16 A. The NSDUH, based on expert
17 analyses, has a definition of opioid use
18 disorder which includes answers to a
19 number of questions that are included in
20 the survey. They aggregate those
21 questions to have an indicator of whether
22 you have opioid use disorder.

23 And this is saying that this
24 is the percent of survey respondents age

1 12 who meet those criteria for having
2 opioid use disorder.

3 Q. Do you know what the results
4 are for Cuyahoga and Summit County for
5 that question?

6 A. The NSDUH unfortunately does
7 not report county-level estimates.

8 Q. And, again --

9 A. Actually -- so, yeah, can I
10 clarify an earlier question? Am I
11 allowed to do that?

12 Q. Sure.

13 A. You asked me in Figure 1.17,
14 does that include Cuyahoga and Summit.
15 My -- my answer was incorrect because if
16 you look at Figure 1.17, it's a
17 state-level figure not a county-level
18 figure. And I believe, I don't know for
19 sure, but I believe Ohio would be in the
20 top 25 of states.

21 Q. Okay. That was going to be
22 a question. So do you think Ohio is in
23 the top 25 percent of shipments per
24 state?

1 A. I don't know for sure.

2 Q. Okay. Do you know how the
3 shipments to Cuyahoga and Summit County
4 compare to shipments to other counties in
5 Ohio?

6 A. I do not.

7 Q. In particular, do you know
8 how the shipments to Cuyahoga and Summit
9 County compare to shipments to Montgomery
10 County, Ohio?

11 A. No, I do not.

12 Q. Paragraph 81 of your report,
13 you write, "Nevertheless, a concern with
14 a simple cross-sectional comparison of
15 this type is that high shipment states
16 may differ from low shipment states in
17 ways that are unobserved, but are
18 nonetheless correlated with the rate of
19 OUD, resulting in potentially misleading
20 estimates of the relationship between
21 shipments and opioid misuse.

22 Do you see that?

23 A. Yes, I do.

24 Q. What do you mean by "ways

1 that are unobserved but nonetheless
2 correlated"?

3 A. What I mean is that there
4 may be omitted variables that represent
5 fundamental differences between states
6 that may impact both the level of
7 shipments and the level of OUD.

8 Q. So this is an example of
9 what we discussed in the abstract before
10 of an omitted variable bias, where
11 something could be impacting both here,
12 correct?

13 MR. KO: Object to the form.

14 THE WITNESS: Something
15 could be. It's not -- it's not --
16 I'm not stating it is true, and
17 I'm not stating it significantly
18 biases this estimate, because it's
19 not a regression estimate. This
20 is an illustrative estimate of two
21 grouped categories. So it's not
22 saying the estimate is wrong.
23 It's saying that I want to confirm
24 it by -- with data that could try

1 and get around these problems.

2 BY MR. GEISE:

3 Q. What are some of the other
4 factors that may explain the variation in
5 opioid use disorder rates between
6 high-shipment states and low-shipment
7 states?

8 A. Once again, a variety of
9 demographic differences, economic
10 differences, and other -- other
11 differences.

12 Q. For purposes of the opioid
13 use disorder rates, did you run a
14 regression to try to control or account
15 for those other factors?

16 A. I don't recall if we did
17 that at some point.

18 Q. You used the word
19 "estimates" in your paragraph to describe
20 the relationship between shipment and
21 misuse. Why did you pick that particular
22 term?

23 A. Can you show me where you're
24 talk -- referring to?

1 Q. Yes. In the last clause of
2 Paragraph 81, you say resulting in
3 potentially misleading estimates of the
4 relationship between shipments and opioid
5 misuse.

6 A. Yeah, that is probably not
7 the appropriate term to use there. I
8 really -- a potentially misleading -- I
9 really mean a potentially misleading
10 conclusion about the relationship between
11 them, because as you know, I'm not
12 providing the estimate here.

13 Q. So you agree, then, that the
14 unobserved variables could mean that the
15 relationship identified here is
16 misleading?

17 A. It may.

18 MR. KO: Object to the form.

19 THE WITNESS: It may; it may
20 not.

21 BY MR. GEISE:

22 Q. And again, you haven't done
23 the regression analysis on those
24 variables to determine if it is or it

1 isn't?

2 A. No, I've not.

3 Q. If we turn to Page 57 of
4 your report in Section C, it is entitled
5 "Opioid-Related Mortality Grew Faster in
6 Areas That Received More Shipments."

7 Do you see that?

8 A. Yes, I do.

9 Q. In the last sentence of
10 Paragraph 82, you provide, "In
11 particular, I ask whether areas that
12 received more shipments of prescription
13 opioids have higher rates of growth of
14 opioid mortality."

15 Do you see that?

16 A. Yes.

17 Q. So here the independent
18 variables are shipments; is that right?
19 Is that one of them?

20 A. I'm not estimating
21 regression model here.

22 Q. Okay. All right. So with
23 regard to your analysis of a potential
24 relationship between shipments and opioid

1 mortality, did you perform a regression
2 analysis to explore that?

3 A. In this report, I did not.
4 This uses the kind of illustrative graphs
5 and regression analysis as contained in
6 Professor Cutler's report.

7 Q. Do you rely on the
8 information contained in Professor
9 Cutler -- Professor Cutler's report for
10 your analysis and conclusions in this
11 section of your report?

12 A. I do not rely on that, no.

13 Q. You don't rely on Professor
14 Cutler?

15 A. In -- I've used Professor
16 Cutler's report in -- I understand
17 Professor Cutler's report. It influenced
18 in the construction of my report. But in
19 the conclusions I draw here, I do not
20 rely on his regression estimates.

21 Q. Why not?

22 A. Because he has the report.
23 So this -- we decided, as a team, to use
24 my report, this introductory report, to

1 clearly and transparently illustrate the
2 causal relationship at hand. But not to
3 delve into the magnitudes that come out
4 of -- that Professor Cutler produces that
5 then feed into Professor McGuire's
6 report.

7 Q. And as you've used the term
8 a couple times in answers, through your
9 figures in that, is that what you refer
10 to illustrating the causal relationship?

11 MR. KO: Object to the form.

12 THE WITNESS: I, as I've
13 talked -- as you mentioned, in my
14 textbook, I think graphic
15 illustration is a very transparent
16 and clear way to illustrate a
17 relationship. And that's what I'm
18 doing here.

19 BY MR. GEISE:

20 Q. But graphic illustrations
21 may also just be demonstrating
22 correlation, not causation, correct?

23 A. That's possible, yes.

24 MR. GEISE: I see it's about

1 quarter to 1:00. We've been going
2 for about another hour. Why don't
3 we take our break for lunch now.

4 THE WITNESS: Sure.

5 MR. KO: Okay.

6 THE VIDEOGRAPHER: The time
7 is 12:44 p.m., and we're off the
8 record.

9 - - -

10 (Lunch break.)

11 - - -

12 THE VIDEOGRAPHER: The time
13 is 1:30 p.m. We are on the
14 record.

15 BY MR. GEISE:

16 Q. Professor Gruber, throughout
17 your report, when you talk about
18 shipments, what is your definition of a
19 shipment?

20 A. It's what it says. It's --
21 it's -- the ARCOS collects data on the
22 amount of each prescription drug. In
23 this case, prescription opioids, that are
24 shipped to -- shipped to distribution

1 points in a given county or they measure
2 a final level, we aggregate it up to
3 county.

4 Q. When you say distribution
5 points, how do you define that?

6 A. I don't know the precise
7 definition, but it's the places that, to
8 which individuals can go to get their
9 opioids. So pharmacies and things of
10 that nature.

11 Q. It would be dispensing
12 locations?

13 A. Dispensing locations would
14 be a better way to put it.

15 Q. And did you conduct analysis
16 of that ARCOS data yourself to determine
17 the shipment numbers or did you rely on
18 Compass?

19 A. As I said before, as is my
20 usual practice in this kind of analysis,
21 when I have very talented research
22 assistants, they handle the data and
23 handle my requests for that information.

24 Q. The ARCOS data that you

1 relied on for the definition of
2 shipments, is that again aggregate for
3 that area, for -- for a county?

4 MR. KO: Object to the form.

5 THE WITNESS: Yeah. Can you
6 try -- try that one again.

7 BY MR. GEISE:

8 Q. Well, sure. It sounds to me
9 like you looked at the ARCOS data for
10 particular opioids and not necessarily
11 opioids from a particular source. Is
12 that fair?

13 MR. KO: Object to the form.

14 THE WITNESS: I don't know
15 what you mean by source.

16 BY MR. GEISE:

17 Q. Okay. You didn't look for
18 the amount of shipments associated with a
19 particular manufacturer.

20 A. That was not the point or
21 purpose of the analysis, no.

22 Q. Nor did you look for the
23 particular amount of shipments from a
24 distributor?

1 A. Once again, we're looking
2 at -- at more aggregated levels of
3 shipments.

4 Q. And -- and that's fine. But
5 by looking at the aggregate level, you
6 didn't look at a particular shipment from
7 a particular manufacturer or distributor?

8 A. I wasn't asked to do that,
9 no.

10 Q. Looking at Paragraph 83 of
11 your report, you write -- and I'll just
12 read the -- the first sentence -- "While
13 this approach identifies substantial
14 differences in opioid mortality rates in
15 areas that received higher and lower
16 levels of shipments, it comes with an
17 important challenge: Comparing shipments
18 across areas does not account for the
19 critical transshipment problem that marks
20 the distribution of prescription opioids
21 in the 2000s."

22 Do you see that?

23 A. Yes.

24 Q. Can you please tell me your

1 definition of transshipment?

2 A. Transshipment would mean
3 opioids that were prescribed to
4 individuals at a given -- in a given
5 location or dispensed into this given
6 location, but were not used by those
7 individuals, instead were transported to
8 be used by individuals in other
9 locations.

10 Q. So consumption of the opioid
11 could take place in a location different
12 than the shipment of the opioid?

13 A. That is correct.

14 Q. So where you used shipments
15 as a proxy for consumption, that proxy
16 would not work in the situation of a
17 transshipment?

18 MR. KO: Object to the form.

19 THE WITNESS: I don't know
20 why it would not work.

21 BY MR. GEISE:

22 Q. Well, if you're using
23 shipments as a proxy for consumption, are
24 you doing that in a particular area or a

1 particular county?

2 A. Well, as I described, within
3 each county we are proxying for use of
4 opioids with the shipments to that
5 county.

6 Q. And if the consumption of an
7 opioid, say, in Cuyahoga County is
8 actually an opioid that was shipped to a
9 different county, then shipments would
10 not be a proxy for consumption in that
11 situation, correct?

12 A. No, that's not correct.

13 Q. Why?

14 A. Because the word proxy --
15 shipments would not be a perfect --
16 perfect non-error -- yes, the word proxy
17 means a proxy. It is our -- it is
18 basically our attempt to measure, using
19 available data as well as possible the
20 amount of opioids in the county.

21 Q. So that is a -- a situation
22 where shipments cannot be a perfect match
23 for consumption in a particular county?

24 MR. KO: Object to the form.

1 THE WITNESS: They may or
2 may not be.

3 BY MR. GEISE:

4 Q. You would agree that in a
5 situation of transshipment, that the
6 consumption does not occur in the same
7 county as the shipment?

8 A. That's the definition of
9 what we mean by transshipment.

10 Q. How did you account for
11 transshipments in determining shipments
12 in a particular county?

13 A. So, in determining shipments
14 to a particular county, we simply
15 measured shipments to that county.
16 Transshipments was accounted -- is
17 clearly a factor that happens,
18 particularly from -- from Florida to
19 places like Cuyahoga and Summit. And
20 that is a reason why it's useful to do
21 the kind of more aggregated analysis that
22 I do in this report to compare very high
23 shipment to very low shipment areas as a
24 factor.

1 Q. In Paragraph 83 of your
2 report, in the last two sentences, you
3 write, with respect to transshipment,
4 "This will induce some measurement error
5 into my comparisons, reducing the power
6 of shipments to distinguish high versus
7 low use areas. To some extent, I address
8 this measurement error by comparing only
9 the highest and lowest shipment areas in
10 the large county sample discussed above."

11 Do you see that?

12 A. Yes, I do.

13 Q. How does comparing only the
14 highest and lowest shipment areas correct
15 for the measurement error that is
16 introduced by the transshipment problem?

17 A. It corrects it because we
18 think that as long as places that have
19 more shipment have more consumption,
20 which then basically -- let me -- let me
21 restart.

22 If there is measurement
23 error in a variable, then comparing two
24 values that are very close to each other

1 may be harder to distinguish than two
2 variables that are much farther apart
3 from each other. So two variables that
4 are very farther apart from each other,
5 we clearly think there's a distinction
6 that places that have high shipments,
7 then at the highest shipments clearly
8 have the highest consumption and places
9 with lower shipments clearly have lowest
10 consumption. Whether two places that
11 have shipments which are one different
12 from each other have different
13 consumption, is unclear.

14 Q. When you account for this by
15 comparing only the highest and lowest
16 shipment areas, do you agree that that
17 analysis then doesn't necessarily apply
18 to the two areas in the middle, the
19 middle two quartiles?

20 MR. KO: Object to the form.

21 THE WITNESS: The analysis
22 here is our best attempt to
23 represent the central tendency in
24 the data.

1 BY MR. GEISE:

2 Q. But what you're comparing is
3 only the highest and lowest shipment
4 areas, correct?

5 A. And as -- as I'm -- as I'm
6 doing, as I explained, the reason I'm
7 doing that is to try to create a format
8 which can illustrate clearly the causal
9 relationship between shipments and harms.
10 And that we think is the best way to do
11 it.

12 Q. What results would you find
13 if you compared the second and third
14 quartiles as opposed to the highest and
15 lowest shipment areas with regard to
16 addressing the measurement error?

17 A. I don't know for sure. But
18 the -- once again, as I described with
19 measurement error, if there's some
20 measurement error, then obviously the
21 more you really distinguish clear groups,
22 like the top and the bottom, the -- the
23 stronger your conclusions can be.

24 Q. A moment ago in one of your

1 answers, you said that there is -- there
2 is higher consumption in areas with
3 higher shipments. Did I hear that
4 correctly?

5 A. Yes, yes.

6 Q. Is that a causal
7 relationship?

8 MR. KO: Object to the form.

9 THE WITNESS: I mean they
10 are basically shipments -- yes,
11 it's a causal relationship, yeah,
12 that's right.

13 BY MR. GEISE:

14 Q. You said that you used
15 shipments as a proxy for consumption.
16 But by that answer you're telling me that
17 consumption is caused by the shipments.

18 A. That's a good point.

19 MR. KO: Is there a
20 question?

21 MR. GEISE: Yes.

22 THE WITNESS: I guess in
23 this -- the way -- the reason I'm
24 using shipments is as a proxy for

1 consumption.

2 I'm not using them because
3 of a particular causal
4 relationship. I'm using them
5 because they are the best
6 available proxy we have for
7 consumption at the county level,
8 and we wanted to carry out this
9 analysis at the county level.

10 BY MR. GEISE:

11 Q. Did you have any discussions
12 with Compass Lexecon to see if there were
13 other ways to measure consumption at a
14 county level?

15 A. Yes.

16 Q. What ways did you consider?

17 A. I don't recall.

18 Q. Did Compass Lexecon report
19 to you about different potential ways to
20 measure consumption at a county level?

21 A. All I recall is we discussed
22 it at various times.

23 Q. So sitting here today, you
24 recall a discussion about other ways to

1 mention -- measure consumption, but you
2 don't recall what any of those
3 discussions were?

4 A. No, I do not.

5 MR. KO: Objection. Asked
6 and answered.

7 BY MR. GEISE:

8 Q. Footnote 97 that accompanies
9 the last sentence in Paragraph 83, in it,
10 you report that your analysis excludes
11 data from four counties that are outliers
12 with respect to the level of per capita
13 shipments.

14 Do you see that?

15 A. Yes, I do.

16 Q. Can you explain what you
17 mean by outliers with respect to the
18 level of per capita shipments?

19 A. What I mean is there were
20 several counties which had shipments per
21 capita which were so implausibly high
22 that clearly they did not -- they were
23 not meaningful proxies for the actual
24 consumption that took place -- the actual

1 use of prescription opioids that took
2 place in that county.

3 We were worried. The idea
4 of an outlier in an empirical analysis is
5 the idea that there could be data which
6 is measured inappropriately and which has
7 an undue influence on the analysis.

8 So a typical thing in
9 economics, typical practice in economics,
10 if you have outlying observations, is to
11 assess the sensitivity to exclude those
12 outlying observations, which is what we
13 did here.

14 Q. Do you recall those -- what
15 four counties were excluded?

16 A. I do not recall. No.

17 Q. Do you recall if they were
18 in Ohio?

19 A. I don't recall.

20 Q. Do you know who among your
21 group of Professor McGuire, Professor
22 Cutler, Professor Rosenthal, might know
23 which counties were excluded?

24 A. I don't know.

1 Q. Do you think any of them
2 know?

3 A. Well, I -- we all -- well, I
4 can't speak for them. I do know --
5 I've -- since this is analysis I'm
6 directing, obviously when there's a
7 decision like this, it's a decision that
8 I take part in. And I know -- and I've
9 seen at some point seen that list. I
10 just don't recall -- I can't recall what
11 the lists.

12 The most important -- the
13 most important thing, if you -- if you
14 continue to read in the footnote, the
15 most important thing is that it doesn't
16 materially change the conclusions if we
17 include them or not. We are just
18 excluding them out of caution here.

19 Q. Turning your attention to
20 Paragraph 84, and in particular Figure
21 1.18.

22 And again, this is a figure
23 that compares the top 25 counties in
24 terms -- top 25 percent of counties in

1 terms of shipments to the bottom

2 25 percent, correct?

3 A. That's correct.

4 Q. And Figure 1.18 looks at
5 prescription overdose mortality rates by
6 those county categories, correct?

7 A. That's correct.

8 Q. Do you know what the
9 prescription overdose mortality rate was
10 in any of these years for Cuyahoga
11 County?

12 A. I don't recall offhand. I
13 have seen it. And there is
14 Cuyahoga-specific data referred to later.
15 Actually, we can look at that. If you
16 look at -- let's see. Okay. If we go
17 to -- later we discuss Cuyahoga and
18 Summit more particularly.

19 Yes. So if you look at --
20 if you look at Figure 1.23, this is all
21 opioid, not just prescription opioids.
22 So it's not quite comparable. But we
23 have the data for prescription opioids
24 only for -- for Cuyahoga and Summit. I

1 just don't have it in this report.

2 Q. Okay. Do you have any
3 opinions today about the prescription
4 overdose mortality rate in Cuyahoga and
5 Summit Counties?

6 A. I believe that if you look
7 at these graphs -- and as I discuss in
8 the history of the opioid crisis -- most
9 of the mortality associated with opioids
10 through the late 2000s was through
11 prescription opioids. And the trends
12 here, at least, look very comparable to
13 the trends nationally. So if you
14 figure -- compare Figure 1.23 to Figure
15 1.18, you know, you see this sort of
16 gradual upward trend in both figures.

17 The magnitudes, it looks
18 like, if I compare the magnitude,
19 obviously the scales are different, so
20 it's a little bit hard to compare. But
21 it looks like the magnitudes are, you
22 know, comparable.

23 Q. And in looking at the, I
24 guess, the data on Figure 1.18 in your

1 chart, did you make any attempt to
2 control for any factors, or is it simply
3 reporting the prescription overdose
4 mortality rate by those county
5 categories?

6 MR. KO: Object to the form.

7 THE WITNESS: So the key
8 thing with this analysis, before
9 we discuss the NSDUH analysis and
10 how that was just comparing one
11 state to another, the key thing
12 with this analysis, additionally
13 at the county level, is we're
14 looking at the changes over time
15 in mortality rates.

16 So by definition we've
17 already sort of controlled for
18 fundamental differences between
19 the two groups of counties.
20 They're represented by the
21 starting points.

22 So the idea of this analysis
23 is anything which is sort of fixed
24 over time, the difference between

1 those counties, is already
2 captured in this graph. That's
3 why we like -- that's why most of
4 this report relies on the
5 mortality data where we can look
6 over time and say in the places
7 that got a lot of shipments after
8 the late 1990s, compared to the
9 places that got few, they look
10 comparable before those shipments
11 began and after those shipments
12 began is when they really
13 diverged.

14 BY MR. GEISE:

15 Q. Let's talk a little bit
16 about illicit opioid use. And in
17 particular, let's turn to page -- or to
18 Paragraph 85 of your report. And you
19 start the paragraph by saying, "As
20 discussed above, rising illicit opioid
21 use coincided with declining shipments of
22 prescription opioids and related events
23 around 2010."

24 Do you see that?

1 A. Yes.

2 Q. Do you acknowledge that
3 there is a negative correlation between
4 shipments and illicit opioid use starting
5 around 2010?

6 MR. KO: Object to the form.

7 THE WITNESS: When you ask
8 about a negative correlation,
9 you've got to tell me more
10 about -- at what level?

11 BY MR. GEISE:

12 Q. Okay. Well, do you agree
13 that shipments are declining at the same
14 time that illicit opioid use is
15 increasing?

16 A. Yes. I agree with that.

17 Q. Do you also agree that after
18 2010, as shipments are declining, opioid
19 mortality rates are increasing?

20 A. Yes, that's true.

21 Q. And in particular, illicit
22 opioid mortality rates?

23 A. Yes. As I describe in the
24 report, their shipments are declining

1 because of these various factors,
2 crackdown on the prescription opioid
3 market, which cause people to shift to
4 illicit opioids. So naturally you're
5 going to see shipments declining while
6 the harms of illicit opioids go up.

7 Q. So in the period of time
8 before 2010, the correlation you find is
9 an increase in shipments and an increase
10 in opioid mortality, correct?

11 MR. KO: Object to the form.

12 THE WITNESS: Once again, as
13 I already in the report, we
14 established a causal relationship
15 here, not just a correlation. And
16 we're doing that is by -- is by
17 splitting these two types of
18 counties, which were once again
19 similar in the mortality rates
20 before 2000 and yet diverged.

21 So I believe we're showing
22 that there was a causal
23 relationship that before 2010, the
24 rise -- the places that saw the

1 big growths in shipments, were
2 also the places that saw the big
3 increase in prescription
4 overdose -- prescription opioid
5 overdose mortality.

6 BY MR. GEISE:

7 Q. Then after 2010 when the
8 prescription opioid shipments decrease,
9 there continues to be an increase in
10 opioid mortality in those counties?

11 A. In -- in those counties as I
12 illustrate later in the -- in the later
13 figures, there continues to be an
14 increase because those counties had
15 people who were already addicted to
16 opioids and they moved onto illicit
17 opioids.

18 Q. Well, we'll talk about the
19 moving on point later. But from
20 statistical examination of it, when the
21 shipments go down, the mortality rate is
22 going up?

23 A. When the shipments of
24 prescription opioids are falling, in --

1 they are falling due to series of actions
2 I described in the report which induce
3 individuals to switch to illicit opioids,
4 so illicit opioid mortality rises.

5 Q. Looking at Figure 1.19 on
6 Page 60 of your report. You have
7 mortality rates involving heroin or
8 fentanyl by county shipment category from
9 large counties, correct?

10 A. Yes.

11 Q. And the mortality involving
12 heroin or fentanyl per 100,000 was higher
13 in the top quartile than it was in the
14 bottom quartile going back to 1999 when
15 this graph starts, correct?

16 A. Right. That's why it's very
17 useful to do a graph like this where you
18 show the evolution over time. Clearly
19 these two sets of counties have some
20 long-run differences in them. The key
21 observation in this graph is that after
22 2010 when there was a move to illicit
23 opioids, the places that had more
24 shipments of prescription opioids were

1 the ones where illicit mortality grew the
2 most.

3 Q. And you say it's important
4 to look at this -- this graph showing the
5 evolution over time, correct?

6 A. Yes.

7 Q. Was there ever a time prior
8 to 1999 when the mortality rate involving
9 heroin or fentanyl was the same in these
10 two quartiles?

11 A. This graph goes back as far
12 as we have the data for large counties.

13 Q. Did you look for -- did you
14 look for data before 1999?

15 A. Actually can I strike that
16 answer? No, large county data are
17 available earlier. We looked to data
18 back to 1990 -- to 1997 at some points,
19 but I don't recall if we looked before
20 1997.

21 Q. And do you know if there was
22 ever a time when the mortality rate
23 involving heroin and fentanyl was the
24 same in these two quartiles?

1 MR. KO: Object to the form.

2 THE WITNESS: No.

3 BY MR. GEISE:

4 Q. Do you know if you or
5 Compass Lexecon or people working with
6 you looked for that information going
7 back to that period of time?

8 A. I am not sure we did.
9 Because once again if you look at this
10 graph, there's a decade where it's clear
11 that these two counties are -- are
12 trending in exactly parallel fashion.
13 And that is enough in my view to
14 establish causally that these two
15 counties were in very similar positions
16 in terms of any changes in use of illicit
17 opioids. And it was only after 2010 the
18 two counties started to deviate. So
19 whether they were the same in 1990 is
20 sort of irrelevant, I think, to this
21 conversation.

22 Q. Well, do you know how the
23 shipment of prescription opioids into
24 these counties compared if and when the

1 mortality rates were equal?

2 MR. KO: Object to the form.

3 THE WITNESS: I don't

4 understand the question.

5 BY MR. GEISE:

6 Q. Sure. So here you have --
7 you split between the top quartile and
8 the bottom quartile in terms of
9 shipments, correct?

10 A. Correct.

11 Q. And even at the beginning of
12 1999, the mortality rate is higher in the
13 counties with the top 25 shipments
14 compared with the bottom 25, correct?

15 A. Correct.

16 Q. What I'm saying is do you
17 know -- and I think you said you don't
18 know if there was ever a time when the
19 mortality rate was the same in those two
20 quartiles, correct?

21 A. And as I said before, I
22 don't know. But the reason I really feel
23 that I need to know is because the
24 evidence is clear from the time period we

1 present to make the causal case that in
2 those counties with high shipments,
3 that's where the illicit deaths went up
4 the most.

5 Q. Wouldn't it be relevant to
6 your analysis if the shipment into those
7 counties -- how that shipment into those
8 counties compared if their mortality
9 rates were equal?

10 MR. KO: Object to the form.

11 THE WITNESS: No, it
12 wouldn't, because the key causal
13 change this report establishes is
14 that the increase in use in harm
15 from illicit opioids arose after,
16 primarily, after the crackdown
17 through abuse deterrent
18 formulations, PDMPs, pill mills,
19 et cetera, in prescription
20 opioids.

21 So in showing the decade
22 before that and showing that these
23 two places are on parallel
24 trends -- they are different. I

1 agree. You've mentioned that, but
2 that's why we show it over time.

3 We show that there are
4 parallel trends. Suddenly what
5 happens after 2010 is when they
6 deviate. Exactly when the --
7 these factors, the abuse deterrent
8 formulation, PDMPs, and pill mill
9 crackdowns and others, happened.

10 BY MR. GEISE:

11 Q. If the mortality rates were
12 equal at a period of time for these
13 counties, and the shipments were still
14 different, wouldn't that indicate that
15 there are additional variables that
16 impact the mortality rate from heroin or
17 fentanyl?

18 MR. KO: Object to the form.

19 THE WITNESS: No.

20 BY MR. GEISE:

21 Q. In Paragraph 87 of your
22 report, first sentence, referring to the
23 figures in Figure 1.20. "As these
24 figures indicate, the growth in opioid

1 mortality including that from
2 prescription and illicit opioids has a
3 strong relationship with per capita
4 shipments of prescription opioids between
5 1997 to 2010 with counties that received
6 more shipments experiencing higher
7 mortality rates."

8 Do you see that?

9 A. Yes.

10 Q. Do you know if there is a
11 relationship between a higher number of
12 shipments of prescription opioids and the
13 number of individual opioid users in a
14 county?

15 A. I would strongly assume that
16 it's very positive, but I don't know the
17 magnitude and I haven't done that
18 analysis.

19 Q. On Footnote 99 of that same
20 page, you cite to a study by David Powell
21 that looked at the impact of improved
22 access to opioids under Medicare Part D,
23 on nonmedical abuse of opioids; is that
24 correct?

1 A. That's correct.

2 Q. And on the third line of
3 your footnote you say, "Recognizing that
4 states differ with respect to the share
5 of the population eligible for Part D,
6 the study established that states with
7 greater eligibility experienced greater
8 increases in opioid supply and greater
9 opportunities for diversion of shipments
10 by recipients or pharmacies in these
11 states."

12 Do you see that?

13 A. Yes.

14 Q. So do you agree that states
15 with populations with greater Part D
16 eligibility experience greater increases
17 in the opioid supply?

18 A. I believe that that is
19 established by this article, yes.

20 Q. And do you agree that
21 shipments to a state are partially driven
22 by greater Part D eligibility?

23 A. Yes, I believe that's once
24 again established by this study.

1 Q. And when we looked at your
2 appendix before of the regression
3 analysis you ran, it -- on second look it
4 doesn't seem like you used as a variable
5 those 65 or over.

6 A. Actually I do. If you go to
7 the regression. The way regressions work
8 is you can't put in a set of variables
9 that add up to one. So in other words,
10 if you want to control for age, you don't
11 put in percent below 65, percent above
12 65. You just put percent below 65. The
13 percent above 65 is implicitly
14 incorporated by the constant term.

15 So when you include these
16 categorical variables, like you'll see
17 white, black, Hispanic, there's another
18 race variable that's not included, those
19 add up to one. So we are essentially
20 controlling for the share over 65 in this
21 regression.

22 Q. Now, do you agree that the
23 defendants in this case do not have any
24 responsibility for how a state handles

1 Medicare Part D eligibility?

2 MR. KO: Object to the form.

3 THE WITNESS: Just not
4 really something I've thought
5 about or have any expertise in.

6 BY MR. GEISE:

7 Q. Well, as you point out in
8 your footnote, populations with greater
9 Part D eligibility experience greater
10 increase in opioid supply, correct?

11 A. That's what the study
12 establishes, yes.

13 Q. Okay. So in terms of why --
14 the relationship to shipments, greater
15 Part D eligibility has an impact on
16 shipments, correct?

17 A. Greater Part D
18 eligibility -- yes.

19 Q. But in this case, do you
20 know if any of the defendants have any
21 responsibility for how a state handles
22 Part D eligibility?

23 MR. KO: Objection. Asked
24 and answered.

1 THE WITNESS: I don't know.

2 BY MR. GEISE:

3 Q. So to the extent that Part D
4 eligibility impacts shipments to a
5 particular county, that's something that
6 the defendants in this case would not
7 have any involvement in, correct?

8 MR. KO: Objection. Asked
9 and answered.

10 THE WITNESS: I just said I
11 don't know.

12 (Document marked for
13 identification as Exhibit
14 Gruber-4.)

15 BY MR. GEISE:

16 Q. Mr. Gruber, I'm handing you
17 what's marked as Exhibit 4 to your
18 deposition. And this is entitled "How
19 Increasing Medical Access to Opioids
20 Contributes to the Opioid Epidemic:
21 Evidence From Medicare Part D." And it's
22 written by David Powell, Rosalie Liccardo
23 Pacula, and Erin Taylor from April of
24 2017.

1 Do you see that?

2 A. I do.

3 Q. And is this the study that
4 you're referring to in Footnote 99 of
5 your report?

6 A. Yes, it is.

7 Q. I want to ask you about a
8 couple of statements in this study. If
9 you could look to Page 2 of Exhibit 4.

10 In the second paragraph, you
11 see where it begins, "Unlike many drugs
12 associated with overdose, deaths, and
13 other harms, opioids remain an important
14 medical tool which in certain cases are
15 even believed to be underprescribed."

16 Do you see that?

17 A. Yes, I do.

18 Q. Are you aware that the
19 economic literature reports that opioids
20 are under -- some believe opioids to be
21 underprescribed?

22 MR. KO: Object to the form.

23 THE WITNESS: I'm -- I'm
24 aware and have read a number of

1 articles, which suggest that in
2 certain instances opioids were not
3 appropriately used to manage
4 pain -- were not used enough to
5 manage pain in certain instances.

6 BY MR. GEISE:

7 Q. Continuing further down in
8 that same paragraph, there's a sentence
9 that reads, "Despite clear concurrent
10 national trends in overdoses and medical
11 distribution of opioids since 1999, as
12 well as geospatial correlations, there is
13 little empirical evidence of the causal
14 relationship between the increasing
15 supply of medically intended opioids and
16 spillovers to the nonmedical market."

17 Do you see that?

18 A. Yes.

19 Q. Do you interpret the phrase
20 "the increasing supply of medically
21 intended opioids" as equating to
22 prescription activity for prescription
23 opioids?

24 MR. KO: Object to the form.

1 THE WITNESS: I'm not sure
2 what they mean by that.

3 BY MR. GEISE:

4 Q. What do you think they could
5 mean by that?

6 A. I think -- I don't want to
7 speak for them. I would interpret it as
8 prescription opioids. That's how I read
9 that sentence.

10 Q. How do you interpret the
11 phrase "spillovers to the nonmedical
12 market" in that sentence?

13 A. I interpret that as use for,
14 you know, use of opioids for which they
15 were not prescribed.

16 Q. If you look on Page 3 of
17 Exhibit 4, the bottom paragraph in the
18 second sentence, the authors write,
19 "However, access to opioids has increased
20 at levels proportional to the rise in
21 overdoses, and there is evidence of a
22 positive correlation between opioid
23 prescribing and opioid abuse."

24 Do you see that?

1 A. Yes.

2 Q. Do you agree that opioid
3 prescribing would be a relevant
4 independent variable to an analysis of
5 the factors driving opioid misuse?

6 MR. KO: Object to the form.

7 THE WITNESS: I believe that
8 there's a number of ways that you
9 can proxy misuse. I think that in
10 my analysis, I think the most --
11 you know, the most empirically
12 relevant for my analysis is
13 shipments. But there's a number
14 of different proxies for the
15 amount of misuse.

16 Not all -- not all opioids
17 that are used are prescribed,
18 because, as you mentioned,
19 diversion earlier. So that would
20 not be a perfect measure, just
21 like shipments is not a perfect
22 measure.

23 BY MR. GEISE:

24 Q. Do any of the comparisons

1 that you conducted in your report control
2 for opioid prescribing?

3 A. Once again, we -- it's all
4 just a question of how you best proxy for
5 the variable you care about, which is the
6 actual opioid use, and opioid prescribing
7 is one proxy. Shipments is another
8 proxy. So we focused on shipments as --
9 because -- because shipments was the data
10 available over time at the county level,
11 which allowed us to do our empirical
12 analysis.

13 Q. Opioids prescribing is -- is
14 a proxy you could have used, but you did
15 not use here?

16 A. Opioid prescribing, I don't
17 believe it's as good a proxy for
18 various -- for various reasons. But
19 certainly the number of prescriptions of
20 opioids is another proxy one could use.

21 Q. You say it's not as good of
22 a proxy. Did you do anything to compare
23 opioid prescribing as a proxy compared to
24 shipments as a proxy?

1 A. What I meant by that
2 statement is it's not as useful for our
3 empirical analysis because we don't have
4 data at the county level over time on
5 prescribing.

6 Q. We'll look at Paragraph 88
7 of your report. And in the first two
8 sentences, you write, "The overview of
9 the opioid crisis in Section 3 above
10 explains how declining shipments of
11 prescription opioids after 2010 transform
12 the opioid crisis from one centered on
13 prescription opioids to one involving
14 both prescription and, to an even greater
15 degree, illicit opioids, first to heroin
16 and later fentanyl. As shown in Figure
17 1.4 above, there was no material trend in
18 heroin mortality nationally from 1999
19 through 2010, but mortality involving
20 heroin accelerated sharply following the
21 end of the dramatic 20-year increase in
22 shipments of prescription opioids."

23 Do you see that?

24 A. Yes, I do.

1 Q. Professor Gruber, do you
2 agree that the sharp increase in heroin
3 mortality after 2010 was due at least in
4 part to fentanyl?

5 A. The sharp increase -- I
6 don't really understand the question, I
7 guess.

8 Q. Well, according to your
9 figures you show an increase in the trend
10 in heroin mortality following 2010,
11 correct?

12 A. Yes. That's in Figure 1.4.

13 Q. Correct. And do you have an
14 opinion whether the increase in heroin
15 mortality following 2010 was due at least
16 in part to fentanyl?

17 MR. KO: Object to the form.

18 Asked and answered.

19 THE WITNESS: I guess I
20 don't understand what you mean,
21 due to -- caused by fentanyl. I
22 don't understand the statement
23 that you're making. Sorry.

24 BY MR. GEISE:

1 Q. Okay. That's okay. When
2 you look at your mortality rates in your
3 report, specifically Figure 1.19 --

4 A. Okay.

5 Q. -- where it's mortality
6 involving heroin or fentanyl by county
7 shipment category and large counties.

8 Do you see that?

9 A. What page is that on?

10 Q. Page 60.

11 A. Yes.

12 Q. So that looks at mortality
13 involving heroin or fentanyl, correct?

14 A. That's correct.

15 Q. All right. And does that
16 mortality rate -- obviously it takes into
17 account fentanyl, correct?

18 A. Yes. This is mortality of
19 heroin or fentanyl.

20 Q. Right. And did the relative
21 risk of dying from heroin use increase
22 during the time period after 2010?

23 A. It increased -- yes, after
24 2010 it increased.

1 Q. Okay. And what was -- what
2 led to the increase in the relative risk
3 of dying from heroin use after 2010?

4 A. What -- let me go back and
5 clarify your question. When you say
6 relative risk, relative to what?

7 Q. Well, on a per capita basis
8 of heroin users, did the mortality rate
9 increase after 2010?

10 A. Okay. So I'm sorry, I have
11 to strike my other answer. That's not
12 what I thought you meant.

13 When you say -- you're
14 saying among heroin -- just to clarify,
15 you're asking among heroin users --

16 Q. Yes.

17 A. -- did the risk of death
18 increase after 2010. I don't recall.
19 That's not in my report. I don't recall
20 whether that's the case.

21 Q. Do you know if -- you cite
22 to the Evans article from 2019 in your
23 report, correct?

24 A. Yes.

1 Q. Do you know if the Evans
2 article talked about fentanyl having a
3 large impact on heroin mortality after
4 2013?

5 A. I don't recall.

6 Q. Did you conduct any analysis
7 to determine to what extent the increase
8 in heroin mortality after 2010 was due to
9 fentanyl?

10 MR. KO: Object to the form.

11 THE WITNESS: What I did --
12 no, I did not conduct that
13 analysis. At least not in the
14 report. We may have looked at
15 that at some point during the year
16 working on this case, but it's not
17 in the report.

18 BY MR. GEISE:

19 Q. Did you conduct any analysis
20 to determine to what extent the increase
21 in heroin mortality was due to
22 carfentanil?

23 A. The same answer that I just
24 gave.

1 Q. Same answer?

2 Is there any reason for
3 purposes of forming your opinions when
4 you're going to talk about mortality
5 involving heroin or fentanyl as depicted
6 in Figure 1.19, why you didn't perform
7 any analysis to see what -- what -- I
8 guess the extent that fentanyl played in
9 that increase in mortality?

10 MR. KO: Object to the form.

11 THE WITNESS: Well, we -- we
12 do show the breakout earlier
13 between -- I believe that's a
14 figure -- I guess I can't recall
15 for sure -- that shows the growth
16 of heroin mortality and fentanyl
17 mortality separately.

18 Certainly we do that for
19 Cuyahoga and Summit. I know those
20 figures exist. I showed you those
21 before, where we show separately
22 for Cuyahoga and Summit, the
23 trends in mortality, so we look
24 at -- no, I'm sorry, that's not

1 right. That's opioid and
2 non-opioid.

3 Hold on. Let me just look
4 for one minute at the list of
5 figures.

6 Yeah, I guess we don't show
7 that here that I recall. Actually
8 Figure 1 -- one second.

9 Yeah, Figure 1.8, on
10 Page 38, we show mortality for
11 prescription opioids, heroin
12 excluding fentanyl and -- and
13 fentanyl.

14 BY MR. GEISE:

15 Q. Correct. And if you look at
16 the lines there, heroin mortality
17 excluding fentanyl goes up in 2010 and
18 then about 2'13 it plateaus through 2'16,
19 correct?

20 A. I don't know exact -- I
21 would say it sort of plateaus in 2014 --

22 MR. KO: 200 -- I'm sorry?

23 THE WITNESS: 2014.

24 MR. GEISE: Two thousand --

1 Sorry.

2 THE WITNESS: 2014. I'd say
3 it plateaus around then. But yes,
4 that's absolutely right. It --

5 BY MR. GEISE:

6 Q. And is there -- I'm sorry.
7 Go ahead.

8 A. There's another spike in
9 heroin mortality after 2010 that sort of
10 plateaus around 2014.

11 Q. And in fact, it -- after
12 2014 it plateaus and decreases, correct?

13 A. At the end of the sample it
14 decreases, yes.

15 Q. On the other hand, mortality
16 involving fentanyl after 2010 to about
17 2013, there's a dramatic increase in
18 mortality involving fentanyl, correct?

19 MR. KO: Object to the form.

20 THE WITNESS: Once again,
21 after 2013 it is a dramatic
22 increase. And I describe in the
23 report essentially the evolution
24 of the sort of increasing

1 inclusion of fentanyl products in
2 opioid distribution. Fentanyl is
3 exceedingly -- is much more
4 dangerous than is heroin. And as
5 a result, as fentanyl gets
6 included, it's causing a much more
7 larger rise in mortality.

8 BY MR. GEISE:

9 Q. Were there any other factors
10 that led to the increase in heroin
11 mortality after 2010 that you considered?

12 A. In -- yes, we considered
13 whether that was due to changes in
14 economic conditions, and we also used --
15 looked at changes in non-opioid mortality
16 as a proxy for other general changes and
17 conditions that might have increased use
18 of any opioids including heroin.

19 Q. You -- you picked 2010 as
20 kind of a sharp demarcation in time. Is
21 that fair?

22 MR. KO: Object to the form.

23 THE WITNESS: In -- in the
24 report, that seems to be clear in

1 the data.

2 BY MR. GEISE:

3 Q. And some of the things you
4 talked about earlier in your deposition
5 that occurred around that time were
6 anti-abuse formulations, prescription
7 drug monitoring programs, and increased
8 law enforcement, do you recall that?

9 A. Those were three of the
10 factors I listed, yes.

11 Q. Now, those factors didn't
12 come online exactly in 2010, correct?

13 A. It's different timing for
14 different factors. There -- but there
15 was not on one date in which all three of
16 those came online.

17 Q. Did you conduct any research
18 into the development and evolution of
19 Ohio's prescription drug monitoring
20 program?

21 A. No, I did not.

22 Q. Do you know when Ohio first
23 had a prescription drug monitoring
24 program?

1 A. I knew at some point, but I
2 don't recall.

3 Q. Do you know the name of
4 Ohio's prescription drug monitoring
5 program?

6 A. Once again I knew at one
7 point, but I don't recall.

8 Q. Did you conduct any analysis
9 about the implementation of Ohio's
10 prescription drug monitoring program in
11 Cuyahoga or Summit County?

12 A. Once again, the analyses in
13 my report are trying to use multiple
14 observations to draw correlational
15 conclusions. Within one state, by just
16 using data on one state, it's impossible
17 to draw a causal conclusion. Well,
18 it's -- more difficult. I'm sorry, I
19 shouldn't say impossible.

20 It is more difficult to draw
21 a causal conclusion about the effect of
22 that state's policy on just that state,
23 without doing a multistate comparison.
24 And therefore, it's very hard to

1 determine the effect on a particular
2 county within the state.

3 Q. So is the answer to my
4 question that you did not do an analysis
5 about the implementation of Ohio's PDMP
6 in Cuyahoga or Summit County?

7 A. Once again I'm saying it
8 would be hard to look at the effect of
9 Ohio's PDMP on -- to take that -- to take
10 that one observation and explain it.
11 That's why when we do these analyses in
12 both my report and Professor Cutler's
13 report, we use large groups of data to
14 look for the -- to look for the causal
15 relationships in the data.

16 Q. And I'm just asking, did you
17 look to see what took place in Cuyahoga
18 and Summit County with the development
19 and evolution of the prescription drug
20 monitoring program to see how it lines up
21 in time with your other opinions?

22 MR. KO: Object to the form.

23 Objection. Asked and answered.

24 THE WITNESS: Once again, we

1 don't know how much we can learn
2 from just lining those up over
3 time, because lots of things are
4 changing over time.

5 BY MR. GEISE:

6 Q. Do you agree that the
7 adoption of prescription drug monitoring
8 programs had an important effect on the
9 market for opioids and heroin?

10 MR. KO: Object to the form.

11 THE WITNESS: I believe it
12 had an effect. The evidence on
13 the magnitude of that effect is,
14 as I discussed in my report, it's
15 mixed.

16 BY MR. GEISE:

17 Q. Who are the entities
18 responsible for adopting prescription
19 drug monitoring programs?

20 MR. KO: Objection.

21 Foundation.

22 THE WITNESS: I actually
23 don't know.

24 BY MR. GEISE:

1 Q. Do you have any
2 understanding that the manufacturers and
3 distributors who are defendants in this
4 case are responsible for adopting a
5 prescription drug monitoring program?

6 MR. KO: Same objection.

7 THE WITNESS: I don't know.

8 BY MR. GEISE:

9 Q. Do you have an opinion as to
10 whether traffickers of illicit drugs from
11 Mexico were a factor in the increase in
12 heroin mortality after 2010?

13 A. Yes. I believe that that
14 was a factor in the increase in mortality
15 after 2010.

16 Q. Did you do anything to
17 assess how much of a factor traffickers
18 from Mexico were in the increasing in
19 heroin mortality deaths after 2010?

20 A. We, once again in our
21 analysis looked at the changes in opioid
22 mortality on the east and west of the
23 Mississippi, which were very different
24 kinds of heroin, to try to look at that.

1 But we did not specifically conduct an
2 empirical analysis of the effect of
3 Mexican trafficking.

4 Q. Did you conduct any analysis
5 as to whether a reduced social stigma in
6 connection with the use of heroin was a
7 factor in the increase in heroin
8 mortality after 2010?

9 MR. KO: Object to the form.
10 Objection. Foundation.

11 THE WITNESS: So let me be
12 clear on what we did. We did, in
13 this report, several things.

14 First, we show a very
15 striking change in heroin
16 mortality at exactly the point
17 when these -- when these changes
18 were coming online.

19 We also then, as following
20 standard empirical practice, said,
21 well, let's make sure -- so we
22 did -- we did three things.

23 We looked at -- we saw the
24 striking time series change. We

1 show heroin and fentanyl mortality
2 go up most in the places that had
3 the more shipments. And we then,
4 as is standard empirical practice,
5 tried to rule out other factors
6 that could explain that.

7 The primary hypotheses of
8 what could explain that are
9 changes in economic conditions and
10 changes in stigma or other
11 attitudes.

12 And the proxies for that is
13 to ask, well, did non-opioid
14 mortality change? If other things
15 were changing which caused people
16 to, say, be less averse to using
17 drugs and that led to more death,
18 you'd see or more deaths from
19 non-opioids, and you don't. Or
20 you don't see that differential
21 emerging across these counties.

22 BY MR. GEISE:

23 Q. Well, did you conduct any
24 analysis as to how many post-2010 deaths

1 resulted from fentanyl-laced non-opioids?

2 A. Fentanyl -- we at some point

3 we looked separately at all -- trends

4 are -- are -- fentanyl-laced non-opioids?

5 Well, let's be clear. When we're

6 defining an opioid death here, it's

7 described in the report, it's a death

8 that involves opioid. So there's no such

9 thing as a fentanyl-laced non -- there

10 are fentanyl-laced, for example,

11 methamphetamine deaths. But that is an

12 opioid death. And so we included that in

13 our count of fentanyl-related deaths.

14 Q. Do you know the percentage

15 of fentanyl-related deaths that involved

16 fentanyl-laced non-opioids?

17 MR. KO: Object to the form.

18 Mischaracterizes the previous

19 answer.

20 THE WITNESS: I do not

21 recall offhand, no. But once

22 again, we are -- the key thing we

23 do here is to look at -- is to

24 establish that this is driven by

1 opioids is to look at the
2 non-opioid mortality.

3 BY MR. GEISE:

4 Q. Did you conduct any analysis
5 as to how many heroin deaths post 2010
6 resulted in individuals who had never
7 consumed prescription opioids?

8 A. There's not an analysis that
9 I'm aware of that's done that. To be
10 clear, I don't know how you'd possibly do
11 that.

12 Q. Now, one of the opinions
13 that you set forth in your report is that
14 the reduction in prescription -- in
15 shipment of prescription opioids
16 beginning in 2010 led to an increase in
17 opioid mortality rates, correct?

18 A. That's correct.

19 Q. Is it your opinion that
20 opioid-related mortality rates would be
21 lower if there had not been a reduction
22 in the shipment of prescription opioids?

23 MR. KO: Object to the form.

24 THE WITNESS: I don't know.

1 BY MR. GEISE:

2 Q. Is that something that you
3 examined?

4 A. Well, you'd have to --
5 before the reformulation, if you look
6 at -- as you can see in Figure 1.8 that
7 we were just looking at, prescription
8 deaths were rising. Now, it's true after
9 2010 opioid deaths rose more rapidly.
10 But we can't say for sure what -- absent
11 the reformulation or absent other policy
12 changes, what would have happened to
13 prescription mortality. It might have
14 started rising itself. We don't know.

15 Q. In Paragraph 51 of your
16 report, you state that, "However, the
17 substitution of illicit opioids for
18 prescription opioids expanded
19 dramatically starting around 2010,
20 closely coinciding with the declines in
21 shipments associated with increased legal
22 enforcement, increased awareness of the
23 potential for abuse, and the launch of
24 abuse-deterrent formulations."

1 Do you see that?

2 A. Yes.

3 Q. Now, in other parts of your
4 report, you have footnotes that you cite
5 for statements contained within the
6 separate paragraphs. There's not a
7 footnote contained for that statement.
8 Is there a cite for your first sentence?

9 A. The first sentence repeats a
10 point that's made multiple times in the
11 report in footnoted ways. I felt it was
12 clear enough -- that I footnoted it clear
13 enough in other contexts that I could
14 sort of summarize here without having to
15 footnote that.

16 Q. Let's look at some of those
17 other contexts that you're talking about.
18 If you can turn your attention to Page 62
19 of your report. You have a heading,
20 "Epidemiological Evidence Establishes the
21 Impact of Prescription Opioids on Heroin
22 Use."

23 Do you see that?

24 A. Yes.

1 Q. And Professor Gruber, do you
2 consider yourself to be an
3 epidemiologist?

4 A. I'm not trained as an
5 epidemiologist, but I am a consumer
6 and -- of the epidemiological literature
7 throughout my career.

8 Q. You don't have a degree in
9 epidemiology?

10 A. No, I do not.

11 Q. You don't teach courses in
12 epidemiology?

13 A. In my both graduate and
14 undergraduate teaching, I do a lot of
15 teaching that involves covering and
16 summarizing epidemiological articles.

17 Q. Okay. But that's different
18 than teaching epidemiology, though,
19 right?

20 A. I do not teach a course
21 entitled "Epidemiology."

22 Q. In looking at Page 67 on
23 your report. You have Table 1.1 that is
24 a summary of epidemiological studies

1 establishing the link between
2 prescription opioids and heroin use.

3 Do you see that?

4 A. Yes. And I apologize for
5 the small font.

6 Q. That's okay. And you list
7 five studies on Table 1.1, correct?

8 A. Yes.

9 Q. And does this table list the
10 studies upon which you relied for your
11 opinions contained in -- I guess it's
12 Subsection 5 of your report, in
13 particular 5A?

14 A. Yes.

15 Q. Are these five studies the
16 only studies of the epidemiological
17 evidence that you considered for
18 portion -- for this portion of your
19 report?

20 A. I don't recall how broadly I
21 looked at articles. But these are the
22 five I relied on primarily.

23 Q. Do you recall looking at
24 other studies or articles and determining

1 not to use them in your report?

2 A. I don't recall.

3 Q. Did you find these five
4 studies yourself or did people within the
5 team working with you identify them for
6 you?

7 A. The people working with the
8 team under my direction, for what kind of
9 studies we're looking for, did a
10 literature review, which is typically
11 done when I do write a -- do a
12 research -- a team carries out a
13 literature review, and they identified
14 these as the key articles.

15 Q. So you -- did you instruct
16 the team to find you literature on
17 epidemiological evidence that established
18 the impact of prescription opioids on
19 heroin use?

20 A. No. I asked them to find
21 studies which studied the link between --
22 you know, when you collect the
23 literature, you need to collect the
24 literature on a question, not a

1 conclusion.

2 So I asked them to find
3 studies that studied the link. After
4 reviewing that literature it became very
5 clear, the conclusion of the literature
6 was very clear that it did establish this
7 link and so those were the studies that
8 focused on this report.

9 Q. When you say the conclusions
10 of the literature, are you referring to
11 the conclusions in these five studies or
12 epidemiological literature in total?

13 A. We did --

14 MR. KO: Object to the form.

15 THE WITNESS: We did not
16 find any studies that we deemed
17 significant that drew a conclusion
18 to the opposite of these. So
19 rather than summarizing an entire
20 literature, we picked the ones --
21 we picked a sample of studies that
22 clearly show this relationship,
23 and I'm not aware of any studies
24 in the epidemiological literature

1 which offer contrary evidence to
2 these -- to this conclusion.

3 BY MR. GEISE:

4 Q. So do you recall if there
5 were any studies in addition to these
6 five that were brought to you for review
7 on this topic?

8 A. I don't recall, but I do
9 recall that there were no studies brought
10 to me that offered a -- a conclusion that
11 differed in a significant way from the
12 conclusion that we just summarized in the
13 report and -- and discuss here.

14 In a number of places in
15 this report, as you pointed out yourself,
16 if things are a little bit vague or
17 uncertain, I call attention to them.
18 This is a -- this we feel is a fair
19 representation of the conclusion from the
20 epidemiological literature.

21 Q. And I think I -- I
22 understand your question, but -- or your
23 answer. But you don't know if you looked
24 at anything in addition to these five

1 studies, correct?

2 MR. KO: Objection. Asked
3 and answered.

4 THE WITNESS: Once again I
5 know I looked at a broader set of
6 studies. I don't recall which
7 ones. But the -- I know that the
8 conclusion did not -- I -- I never
9 saw a study which drew a different
10 conclusion than the -- than the
11 results I'm summarizing here.

12 BY MR. GEISE:

13 Q. So I'm going to ask you
14 about some studies, but I just want to
15 clarify that on the record. It -- it's
16 your testimony that you never saw an
17 epidemiological study which drew a
18 different conclusion than the result you
19 summarize in this section of your report?

20 A. I did not.

21 Q. Now, with regard to the link
22 between prescription opioid use and
23 heroin use, have you heard that referred
24 to as a gateway hypothesis?

1 A. Yes.

2 Q. What is your understanding
3 of the gateway hypothesis?

4 A. Well, it's -- gateway
5 hypothesis generally is the notion that
6 there are certain drugs through which
7 their use that leads you to move onto
8 another drugs.

9 Q. Have you also heard of a
10 theory called the common liability to
11 addiction theory?

12 A. No, I've not.

13 Q. You've not come across that
14 in any of your review of the literature?

15 A. I mean I may have, but I
16 don't recall the -- I don't recall that
17 term.

18 Q. Since you don't recall that
19 term, am I safe to assume that you didn't
20 consider that theory as part of your
21 analysis in this case?

22 A. Yes.

23 Q. Professor Gruber, have you
24 ever written an academic paper on the --

1 the gateway hypothesis?

2 A. I believe I've discussed --
3 I may have discussed -- I may have
4 discussed it in some of my work, but I
5 don't recall. I certainly never wrote an
6 article where that was the sole focus.

7 Q. Do you agree that there are
8 a number of paths an individual can take
9 to becoming a heroin user?

10 MR. KO: Object to the form.

11 THE WITNESS: I don't -- I
12 guess that's a really broad
13 question. I don't quite
14 understand what you mean.

15 BY MR. GEISE:

16 Q. Well, based on your report,
17 it appears one of the views you take
18 is -- is that prescription opioids is one
19 path somebody can take to becoming a
20 heroin user, correct?

21 A. Yes.

22 MR. KO: Object to the form.

23 BY MR. GEISE:

24 Q. But you don't think that's

1 the only path somebody could take to
2 becoming a heroin user, correct?

3 A. That's correct.

4 Q. Somebody can initiate heroin
5 use without ever using any other drug or
6 substance before that, correct?

7 A. That is correct.

8 Q. People can progress from
9 using cocaine to then using heroin
10 following using cocaine, correct?

11 A. I'm not an expert in this
12 area, so you're now sort of extending
13 beyond what I know about drug pathways.

14 Q. Well, let me ask you. If
15 you're not an expert in this area, how do
16 you feel comfortable providing an opinion
17 about people transitioning from
18 prescription opioids to heroin?

19 A. What I mean by that is I'm
20 not an expert in all the various pathways
21 by which people become addicted to
22 heroin. I also, before reviewing
23 literature, would not have considered
24 myself an expert on the particular

1 pathway. I -- I was aware of -- of the
2 view that there was that pathway. But
3 it's not something I'd studied in my
4 academic research. That's why I do a
5 literature review. And I did the
6 literature review and it clearly
7 established that pathway. I have not
8 reviewed the literature on all pathways
9 to heroin. That's why I said I don't
10 consider myself an expert on all the
11 possible pathways one could lead to
12 heroin use. I viewed the literature on
13 this pathway, and I do -- do consider
14 myself an expert on that.

15 Q. So you consider yourself an
16 expert on the pathway of prescription
17 opioid use to heroin use on the basis of
18 your review of these five epidemiological
19 studies?

20 MR. KO: Object to the form.

21 THE WITNESS: I believe,
22 based on my -- based on the data
23 I've looked at, these
24 epidemiological studies, the

1 economic studies I'm sure we'll
2 discuss soon, I believe based on
3 that literature that I've
4 developed an expertise on that
5 question, yes.

6 BY MR. GEISE:

7 Q. But you agree with me that
8 you're not an expert in the pathways of
9 becoming a user of heroin?

10 A. I am not an expert in all
11 the possible pathways of becoming a user
12 of heroin, no.

13 Q. When you qualify it by
14 saying you're not an expert in all the
15 possible pathways of becoming a user of
16 heroin, is it accurate to say that the
17 only pathway you believe you're an expert
18 in is prescription opioids and the use of
19 heroin?

20 MR. KO: Object to the form.

21 THE WITNESS: That's the one
22 that I focused on, yes.

23 BY MR. GEISE:

24 Q. Not only have you only

1 focused on that one, but you haven't
2 compared that pathway to any other
3 pathway of becoming a heroin user?

4 A. I have not studied that, no.

5 Q. In your review of any
6 literature, have you seen it described
7 that another pathway of becoming a heroin
8 user is -- is through binge drinking?

9 A. I have not seen that, no.

10 Q. Have you seen any literature
11 that discusses marijuana as a pathway to
12 becoming a heroin user?

13 A. Once again I'm sure there
14 are literatures out there on a number of
15 different pathways. That's not really --
16 what I'm studying here is establishing --
17 this is part of a suite of evidence that
18 I establish in this report. In this
19 report I'm using this epidemiological
20 evidence to support the conclusion of
21 both the economic evidence and the data I
22 show that this pathway is functional and
23 important. I'm not offering to rule out
24 all possible pathways for that -- for

1 the -- for developing the use of heroin.

2 Q. And you don't have an
3 opinion as to how this particular
4 potential pathway compares to other
5 potential pathways, correct?

6 MR. KO: Object to the form.

7 THE WITNESS: I do not have
8 an opinion on that, no.

9 (Document marked for
10 identification as Exhibit
11 Gruber-5.)

12 BY MR. GEISE:

13 Q. Professor Gruber, I'm
14 handing you what's marked as Exhibit 5 to
15 your deposition. This is an article
16 entitled "Relationship Between Nonmedical
17 Prescription Opioid Use and Heroin Use."

18 Do you see that?

19 A. Yes, I do.

20 Q. And this is an article that
21 appeared in The New England Journal of
22 Medicine in 2016, correct?

23 A. Yes.

24 Q. And the -- the lead author

1 identified is Wilson M. Compton, M.D.

2 Do you see that?

3 A. Yes.

4 Q. Now, one of the things I
5 wanted to ask you, when you looked at the
6 five studies that are listed in Table 1.1
7 of your report, those are -- the dates of
8 those studies are 2013, '14, and '15,
9 correct?

10 A. Yes, correct.

11 Q. Did you look at any
12 epidemiological studies from after 2015
13 for purpose of forming your opinion in
14 this case -- on this topic?

15 A. In this case at all?

16 Q. On this topic.

17 A. On this topic. I don't
18 recall.

19 Q. Now, the study identified --
20 this New England Journal of Medicine
21 article from 2016 is not one that you
22 list in your Table 1.1, correct?

23 A. That's correct.

24 Q. Do you recall from looking

1 at the title if this was one that you saw
2 during your research in this case?

3 A. I do not recall. Sorry.

4 Q. Well, I want to just ask you
5 about a couple passages in here. And I
6 understand that you haven't had the
7 opportunity to read it yet because you
8 didn't look at it for purposes of forming
9 your opinion. But I want to get your
10 reaction to some of the statements from
11 the authors. If you look at Page 155
12 second paragraph.

13 It begins, "Some persons
14 certainly use heroin when they are unable
15 to obtain their preferred prescription
16 opioid; however, whether the increases in
17 heroin trends in the overall population
18 are driven by changes in policies and
19 practices regarding prescription opioids,
20 it's much less clear."

21 Do you see that?

22 A. Yes, I do.

23 Q. Do you agree that that
24 statement would -- would be contrary to

1 the conclusions you draw in this section
2 of your report?

3 A. You know, once again, I
4 haven't read this report. Certainly that
5 statement looks that way, but it's not
6 footnoted. I'm not sure what evidence
7 it's based on. I'm not -- so I don't
8 really know what to make of that
9 sentence.

10 Q. You told me in reviewing the
11 epidemiological literature that you had,
12 for purposes of your report, that you
13 didn't see anything that questioned the
14 conclusion that you came to; is that
15 correct?

16 A. No. I said I saw nothing
17 that significantly differed --

18 Q. Okay.

19 A. -- from the conclusion that
20 I came to.

21 Q. So would you consider this
22 passage to significantly differ --

23 A. No.

24 Q. -- from the conclusion that

1 you came to?

2 A. No.

3 Q. Okay. If you look at Page
4 156 of Exhibit 5. In particular, there
5 is a bar in the middle of the first
6 column. And after that, the authors
7 write, "Studies that address the patterns
8 of heroin use in nonmedical users of
9 prescription opioids are mostly
10 observational and descriptive, i.e.,
11 non-experimental; thus, conclusions about
12 cause and effect are uncertain."

13 Do you see that?

14 A. Yes, I do.

15 Q. Would that statement
16 significantly differ from the conclusions
17 that you drew in this portion of your
18 report?

19 MR. KO: Object to the form.

20 THE WITNESS: No it
21 wouldn't. The conclusions that I
22 drew in this table show, using
23 typical epidemiological methods, a
24 correlation.

1 I don't -- I don't believe I
2 used the word "causal" in
3 discussion of the epidemiological
4 literature. As I've said before,
5 this report, like good economic
6 studies tries to use multiple
7 dimensions of evidence to make
8 it's case. The epidemiological
9 evidence is consistent, I believe
10 always consistent with the case
11 I'm making.

12 I did not claim that
13 these -- that these were
14 establishing causal relationships
15 as opposed to consistent bodies of
16 evidence.

17 BY MR. GEISE:

18 Q. Would you agree that the
19 study that refers to a conclusion about
20 cause and effect between prescription
21 opioid use and heroin use as uncertain,
22 is inconsistent with the statement in
23 your report that the link between
24 prescription opioids and heroin use is

1 established?

2 MR. KO: Object to the form.

3 Also object to the extent it
4 mischaracterizes this review
5 article, which actually doesn't
6 appear to be a study to the extent
7 that you are describing it, Steve.

8 I'm not clear on how you're
9 describing a study. But it's
10 actually a review article.

11 BY MR. GEISE:

12 Q. You can answer.

13 A. Can you show me to where
14 you're referring?

15 Q. Well, the heading on your
16 Table 1.1 says "Summary of
17 Epidemiological Studies Establishing the
18 Link Between Prescription Opioids and
19 Heroin Use."

20 Do you see that?

21 A. Yes.

22 Q. And would you agree that the
23 statements I've pointed to you in
24 Exhibit 5 tend to question that link?

1 MR. KO: Object to the form.

2 THE WITNESS: So can you
3 point me to specific statements
4 again. Sorry.

5 BY MR. GEISE:

6 Q. Sure. On Page 155, where it
7 says, "Some persons certainly use heroin
8 when they are unable to obtain their
9 preferred prescription opioid; however,
10 whether the increases in heroin trends in
11 the overall population are driven by
12 changes in policies and practices
13 regarding prescription opioids is much
14 less clear." And on Page 156, where it
15 says, "Studies that address the patterns
16 of heroin use in nonmedical users of
17 prescription opioids are mostly
18 observational and descriptive, i.e.,
19 non-experimental; thus, conclusions about
20 cause and effect are uncertain."

21 A. And what's the question?

22 Q. Do you believe that
23 statements like that in this article is
24 inconsistent with the conclusion that

1 epidemiological studies have established
2 a link between prescription opioids and
3 heroin use?

4 MR. KO: Object to the form.

5 THE WITNESS: I believe that
6 clearly the person whose these
7 sort of non-footnoted opinions are
8 expressed, clearly would not agree
9 with the title of that table.

10 BY MR. GEISE:

11 Q. I'm going to ask you to look
12 at Page 157 of this article. And the
13 second -- at the bottom of the left-hand
14 column, you see, "As seen in Table 1, in
15 addition to the 138.9 percent increase in
16 heroin use among nonmedical users of
17 prescription opioids between the period
18 of 2002 to 2004, and the period of 2011
19 to 2013, heroin use increased
20 97.5 percent among nonmedical users of
21 other prescription drugs (stimulants,
22 tranquilizers and sedatives),
23 87.3 percent among users of cocaine,
24 57.3 percent among people who binge

1 drink, and 45.4 percent among marijuana
2 users."

3 Do you see that?

4 A. Yes.

5 Q. And I think you told me
6 before that studying other pathways to
7 heroin use isn't something that you did
8 in this case, correct?

9 A. That's correct. I think the
10 key point to remember is there are
11 multiple pathways. I'm not claiming in
12 Table 1.1 or in my report that this is
13 the only pathway. I'm just claiming that
14 there is a pathway.

15 Q. So by admitting that you're
16 not claiming that it's the only pathway,
17 you're just saying it is a pathway, by no
18 means do you suggest that the total
19 increase in heroin use is attributable to
20 prescription opioids?

21 MR. KO: Object to the form.

22 THE WITNESS: I didn't say
23 that.

24 BY MR. GEISE:

1 Q. And do you know what
2 percentage of the increase in heroin use
3 is attributable to prescription opioids?

4 A. I do not know. I believe
5 Professor Cutler has some analysis that
6 speaks to that, and he finds the vast
7 majority is due to prescription opioids.

8 Q. You're citing to an opinion
9 from Professor Cutler. You haven't
10 formed that opinion yourself?

11 A. I respect what Professor
12 Cutler has done, and I've seen it in his
13 report.

14 Q. Do you respect what
15 Dr. Compton and the other authors in this
16 New England Journal of Medicine article
17 have done?

18 A. I haven't read the article,
19 and I don't know who they are. So I
20 don't have a strong opinion.

21 Q. If I can ask you to look at
22 Page 160 of Exhibit 5. On the second
23 column under conclusions, midway through
24 that first paragraph, do you see the

1 clause that says, "Heroin use among
2 people who use prescription opioids for
3 nonmedical reasons is rare and the
4 transition to heroin use appears to occur
5 at a low rate."

6 Do you see that?

7 A. Yes.

8 Q. Is that consistent with the
9 studies you reviewed?

10 A. Sure.

11 Q. If you look at the bottom
12 paragraph on Page 160 of Exhibit 5, in
13 the middle of the paragraph there's a
14 sentence that begins with alternatively.
15 And it reads, "Alternatively, heroin
16 market forces, including increased
17 accessibility, reduced price, and high
18 purity of heroin, appear to be major
19 drivers of the recent increases in rates
20 of heroin use."

21 Do you see that?

22 A. Yes.

23 Q. And you notice that there
24 are also citations to that statement?

1 A. Yes, I do.

2 Q. Professor Gruber, are you
3 aware of data showing an increased supply
4 of heroin was a major driver of increases
5 in rates of heroin use?

6 A. I -- I think -- I'm not
7 aware of the data. I'm aware that that
8 is -- that that's been discussed, yes.

9 Q. Did any of the studies you
10 cited in Table 1.1 control for the
11 increased supply of heroin?

12 A. Two responses to that.
13 First of all, once again, the -- the goal
14 of the report was to establish this
15 causal relationship between prescription
16 opioids and outcomes, including heroin
17 use. That's why we show in the report
18 that heroin use and fentanyl use, if you
19 go to -- we discuss this in
20 Figure 1.18 -- 1.18, that's what we show
21 in figure -- no. Figure 1.19, that while
22 it's true heroin use rose nationally, it
23 rose more in the places which had more
24 opioid shipments, which is both

1 consistent with the epidemiological
2 evidence we reviewed and also consistent
3 with the economic evidence reviewed in
4 this study.

5 Q. Professor Gruber, were you
6 aware of data showing that increased
7 accessibility was a major driver of
8 increases in rates of heroin use?

9 MR. KO: Object to the form.

10 THE WITNESS: I am not aware
11 of that data, but I think there's
12 one other important point to
13 remember here which is, even if
14 it's increased supply and
15 increased accessibility, people
16 have written, I don't remember the
17 exact citations, that essentially
18 prescription opioids can play a
19 role through increased supply and
20 increased accessibility, as well,
21 by creating what we call sort of a
22 thick market for heroin use, that
23 by creating a body of supply can
24 arise to meet demand, that by

1 creating a body of individuals who
2 are addicted to opioids and
3 looking to meet that addiction,
4 that can lead to a concomitant
5 increase in the supply of illicit
6 opioids as well.

7 BY MR. GEISE:

8 Q. Professor Gruber, are you
9 aware of data showing that reduced prices
10 were a major driver of increases in the
11 rates of heroin use?

12 MR. KO: Object to the form.

13 THE WITNESS: I am not, no.

14 BY MR. GEISE:

15 Q. Are you aware of data
16 showing that high purity was a major
17 driver of increases in rates of heroin
18 use?

19 MR. KO: Object to the form.

20 THE WITNESS: It's not
21 something I've studied, no.

22 BY MR. GEISE:

23 Q. So you did -- those last two
24 concepts are not something you studied

1 for purposes of your opinions in this
2 case?

3 A. Once again, the purpose of
4 my opinion was to show conclusively that
5 there is a causal relationship between
6 shipments of prescription opioids and the
7 increase in both licit and illicit opioid
8 use. And that's what I do in the report.

9 Q. Professor Gruber, if you can
10 look at the second paragraph in the
11 conclusion section on Page 160 of
12 Exhibit 5, the -- the last sentence
13 reads, "Although some authors suggest
14 that there is an association between
15 policy driven reductions in the
16 availability of prescription opioids and
17 increases in the" --

18 A. I'm sorry, one second. I --
19 I haven't found where you are.

20 Q. I'm sorry.

21 A. Want to state it again?

22 Q. Page 160 --

23 A. Oh, I see. Got it. Go
24 ahead.

1 Q. Second paragraph under
2 conclusions.

3 A. Yep, got it.

4 Q. Middle of that paragraph
5 reads, "Although some authors suggest
6 that there is an association between
7 policy driven reductions in the
8 availability of prescription opioids and
9 increases in the rates of heroin use, the
10 timing of these shifts, many of which
11 began before policies were robustly
12 implemented, makes a causal link
13 unlikely."

14 Do you see that?

15 A. Yes, I do.

16 Q. Is -- is that statement from
17 these authors inconsistent with your
18 conclusions in your report?

19 A. Yes, it is.

20 Q. And this was not a study
21 that was brought to your attention when
22 you were forming your report?

23 A. Once again I'm not sure.

24 But it is a study which is at odds with

1 both -- and once again, this is an
2 opinion. The opinion expressed in this
3 report are at odds with both the
4 epidemiological studies I reviewed, the
5 economic evidence and the data that I
6 showed you.

7 Q. When you asked your team to
8 bring you articles, you didn't tell them
9 to only bring you articles that would
10 support the position you were going to
11 give, correct?

12 A. No. As I stated earlier, I
13 asked for a review of the literature.

14 Q. And -- and this wasn't a
15 piece of literature you were provided?

16 A. Once again I don't know --
17 as I said, I don't recall whether I saw
18 this article or not.

19 MR. KO: Steve, whenever --
20 whenever is convenient --

21 MR. GEISE: Let me -- let me
22 get through one more article. It
23 shouldn't take as long as the last
24 one.

1 (Document marked for
2 identification as Exhibit
3 Gruber-6.)

4 BY MR. GEISE:

5 Q. Professor Gruber, I'm
6 handing you another article. It's marked
7 Exhibit 6 to your deposition. This is
8 entitled "U.S. Regional and Demographic
9 Differences in Prescription Opioid and
10 Heroin Related Overdose
11 Hospitalizations."

12 Do you see that?

13 A. Yes.

14 Q. And the authors here are
15 George Unick and Daniel Ciccarone?

16 A. Yes.

17 Q. And you see that this was
18 published in a final edited form in the
19 International Journal of Drug Policy,
20 correct?

21 A. That's what it indicates,
22 yes.

23 Q. And I just want to -- we'll
24 do this quickly. If you turn to Page 3

1 of Exhibit 6. In -- in the first full
2 paragraph, the authors write, "However,
3 there are reasons to view the causal
4 relationship between PO" -- which is
5 prescription opioid -- "availability and
6 use of heroin use as only a partial
7 explanation for the recent increase in
8 heroin use and subsequent harms.

9 "First, drug use gateway
10 arguments in general have been widely
11 discredited and should be viewed with
12 caution."

13 Do you see that?

14 A. Yes.

15 Q. And are you aware of the
16 literature that cautions that gateway
17 arguments have been discredited?

18 A. I do not agree with
19 discredited. I'm aware of the literature
20 that's questioned gateway arguments which
21 are largely based on correlations, not
22 causal inferences.

23 MR. GEISE: Why don't we
24 take a break now.

1 THE VIDEOGRAPHER: The time
2 is 2:50 p.m. We are off the
3 record.

4 (Short break.)

5 THE VIDEOGRAPHER: The time
6 is 3:07 p.m. We are on the
7 record.

8 (Document marked for
9 identification as Exhibit
10 Gruber-7.)

11 BY MR. GEISE:

12 Q. Professor Gruber, I'm
13 handing you a publication that's marked
14 as Exhibit 7 to your deposition. This is
15 entitled "Increased Use of Heroin As an
16 Initiating Opioid of Abuse."

17 Do you see that?

18 A. Mm-hmm.

19 Q. And the lead author listed
20 on this communication is Theodore J.
21 Cicero.

22 Do you see that?

23 A. Yes.

24 Q. And do you recognize that

1 author?

2 A. Yes, I do.

3 Q. In fact, of the five
4 epidemiological studies that you list on
5 Table 1.1, two of them were written by
6 Cicero, correct?

7 A. That's correct.

8 Q. Let me ask you, this is from
9 2017 and appeared in the journal
10 "addictive behaviors".

11 Do you see that?

12 A. Yes.

13 Q. Have you seen this document
14 before?

15 A. This one, I've not.

16 Q. Okay. When you sent your
17 team out to research literature in this
18 field, did you ask them to pull all the
19 materials from Cicero?

20 A. No. I asked them to pull
21 the literature on the relationship
22 between prescription opioid use and
23 illicit opioids.

24 Q. I'm going to ask you about a

1 couple of passages from this article from
2 Cicero in 2017.

3 If you look at the
4 right-hand column on Page 64, under
5 results, do you see where it says "first
6 opioid"?

7 A. Yes.

8 Q. And the second sentence
9 reads, "Only 8.7 percent of opioid
10 initiates who began regular use in 2005
11 started with heroin. But its use sharply
12 increased thereafter to the point where
13 in 2015, heroin as an initiating opioid
14 was at its highest point, 33.3 percent,
15 with no evidence of stabilization."

16 Do you see that?

17 A. Yes.

18 Q. In your analysis in your
19 report, did you account for the increase
20 in heroin initiation?

21 A. Yes.

22 Q. Okay. And did your analysis
23 account for the trend of the increase in
24 people who had their first initiation of

1 an opioid with heroin?

2 A. That was not explicitly a
3 factor, but if you look -- if you review
4 the discussion in my -- in my report, as
5 I say there was a clear sort of chain of
6 events, if you will, where people first
7 became dependent on prescription opioids.
8 When those became more difficult to
9 obtain a more expensive after 2010, they
10 switched to heroin, and then as fentanyl
11 came in, it became a more profitable and
12 cheaper substitute, individuals then
13 transitioned -- much of the harm, if you
14 will, transitioned from heroin to
15 fentanyl.

16 So I'm not surprised by
17 their conclusions in this report.

18 Q. Now, with respect to your
19 direction to your team, did you ask them
20 to find studies that showed a
21 relationship between prescription opioid
22 use and heroin use, or did you ask for
23 studies that discussed whether there was
24 a relationship?

1 A. The latter. And if I
2 misspoke, I'm sorry.

3 Q. I'm not hearing things
4 clearly, so I'm not going put the blame
5 on you.

6 A. No, no, I may have misspoke.

7 Q. If you can look at the last
8 sentence -- or the first sentence under
9 the last section called "discussion" on
10 Page 64.

11 Do you see that?

12 A. Yes.

13 Q. And it says, "The rapid
14 fourfold increase in the use of heroin by
15 new initiates to opioid use from 2005 to
16 2015 is a striking finding with
17 significant public health implications."

18 Do you see that?

19 A. Yes.

20 Q. Okay. According to this
21 paper from Cicero, the number of
22 individuals who initiate opioid use with
23 heroin was increasing, correct?

24 A. I have not read the article.

1 That is certainly what follows from both
2 the graph I looked at and what -- the
3 sentences you read.

4 Q. And from 2005 to 2015, the
5 percentage of opioid initiates who
6 began with -- started with heroin, went
7 from 8.7 percent to 33.3 percent,
8 correct?

9 A. That's what the article
10 says.

11 Q. Okay. And in the analysis
12 by Cicero here, he also speculates that
13 opioid novices may be dying at a higher
14 rate because they are initiating with
15 heroin. Are you familiar with that
16 discussion?

17 MR. KO: Object to the form.

18 THE WITNESS: I don't
19 know --

20 BY MR. GEISE:

21 Q. And in your review of the
22 other studies, did you see it discussed
23 where the increase in initiation with
24 heroin was a cause of higher death rates

1 because of the relative risk of mortality
2 from heroin?

3 A. I think, once again, it's
4 important to remember the sequence of
5 events here. The studies I focused on
6 were talking about the initiation -- the
7 gateway, as the term you used, from
8 prescription opioids to heroin, around
9 the era when prescription opioids were
10 expanding.

11 After 2010 when prescription
12 opioids were falling off, it's not
13 surprising that an increase in use of
14 illicit opioids was by people who started
15 with opioids, because prescription
16 opioids were harder to get to fill that
17 high.

18 Moreover, as I -- as I said,
19 it's not studying the report. But as
20 I -- as I -- has been discussed by a
21 number of experts on the opioid crisis,
22 the -- there was an expansion in the
23 opioid market that essentially created --
24 this thick market for heroin was created

1 by the expansion of prescription opioids.

2 So the story that I make
3 clear, the explanation that I make clear
4 in my report, is one of expanding of
5 prescription opioids during the 2000s,
6 1990s to 2000. When they fell off,
7 people turned to heroin. Heroin was more
8 readily available because people had
9 become addicted to opioids. And thus,
10 it's not surprising that the new people
11 who are starting these drugs after 2010
12 would start with heroin. After all,
13 prescription opioids were much harder to
14 get.

15 Q. People have initiated opioid
16 use with heroin for decades, correct?

17 A. I presume so.

18 Q. People -- back in the 1960s,
19 people would initiate opioid use with
20 heroin?

21 A. That's true.

22 Q. And it's no different now,
23 and you can see in 2015 in this paper,
24 people are initiating opioid use with

1 heroin?

2 A. It's very difficult. In
3 1960, as I say in my report, if you look
4 at -- I guess I don't -- the number of
5 individuals who were dying from heroin, I
6 guess I don't have those numbers here.

7 I believe the number of
8 individuals dying from heroin was at a
9 much, much lower rate, so I don't
10 think -- in the late 1960s than it was
11 post 2010. So I don't think you can
12 really compare the two eras and draw
13 conclusions from one to the other.

14 Q. Right. And what was the
15 percentage of heroin users in the 1960s
16 that also had fentanyl either with their
17 heroin or available to them?

18 A. I believe it's zero. I
19 don't believe fentanyl was around.

20 Q. That's a major difference
21 between the 1960s and 2010s, correct?

22 A. That's one of a number of
23 differences. It's also true that there
24 wasn't an expansion in prescription

1 opioids to which they became addicted.

2 Q. Additional things that we've
3 already talked about that are different
4 in the 2010 period are the increased
5 accessibility to heroin, correct?

6 A. Once again, my understanding
7 is there was an increase in accessibility
8 to heroin. And my understanding is that
9 that was at least in part, if not wholly,
10 due to the increased profitability of
11 setting up markets in heroin because
12 there was a large population now of
13 opioid users.

14 Q. Well, drug dealers have been
15 setting up markets for ages, correct?

16 A. They haven't been setting up
17 markets in heroin in many of the places
18 where heroin really expanded in the
19 2000s.

20 Q. Did you study that?

21 A. Certainly, if you look at
22 where heroin expanded, if you look at
23 the -- it's not in my report, but I've
24 seen the data, which -- and this is -- so

1 I'm now going on my recollection of the
2 data. I don't have a specific citation.
3 My recollection of the data is there were
4 both groups which were non-traditional
5 heroin users in area -- areas where
6 heroin is not a traditional drug of
7 choice, was a large expansion of heroin
8 use in the -- around -- in the sort of
9 post-2010 period.

10 Q. Do you recall the source for
11 that data?

12 A. I don't.

13 Q. Do you recall if it's
14 contained on any of the data sources
15 listed in your appendix?

16 A. I don't.

17 Q. Do you recall if that was a
18 discussion that you had as part of your
19 discussions with Professors Cutler and
20 McGuire?

21 A. Yes, it was part of our
22 broad discussions. We -- it certainly --
23 and once again, I don't claim it raises
24 to the level of evidence in this report.

1 It's not -- I haven't studied it and put
2 data to it. It is what -- it's sort
3 of -- for want of -- it's in the
4 narrative discussions of the opioid
5 crisis. It's discussed in a number of
6 epidemiological and economic articles,
7 but I can't point you to a specific
8 reference.

9 (Document marked for
10 identification as Exhibit
11 Gruber-8.)

12 BY MR. GEISE:

13 Q. Professor Gruber, I'm
14 handing you what's been marked as
15 Exhibit 8 to your deposition. This is
16 another article entitled "Nonmedical
17 Prescription Opioid and Pathways of Drug
18 Involvement in the U.S.: Generational
19 Differences."

20 Do you see that?

21 A. Yes, I do.

22 Q. And this is from -- it was
23 published online in 2017 and then
24 published in print, final edited form, in

1 2018 in the Journal of Drug and Alcohol
2 Dependency, correct?

3 A. Drug and Alcohol Dependence,
4 yes.

5 Q. I'm sorry.
6 Are you familiar with this
7 article?

8 A. I don't recall if I reviewed
9 this article before.

10 Q. Are you familiar with that
11 journal?

12 A. Yes.

13 Q. Now, the title here,
14 "Nonmedical Prescription Opioids and
15 Pathways of Drug Involvement in the
16 U.S.," that title alone would be
17 responsive to the question you posed to
18 your research team in terms of articles
19 to search for, correct?

20 MR. KO: Object to the form.

21 THE WITNESS: That would
22 certainly seem to fall within the
23 set of questions I was interested
24 in learning about.

1 BY MR. GEISE:

2 Q. And do you recall if your
3 research team brought this article to you
4 when they brought you to the other five
5 epidemiological studies you looked at?

6 A. Once again I do not recall.

7 Q. If I can turn your attention
8 to what's marked as -- as Page 14 at the
9 top of the pages.

10 A. Page 14 at the top.

11 MR. KO: Page 14 of this?

12 THE WITNESS: I don't have
13 that.

14 BY MR. GEISE:

15 Q. Let me find it.

16 A. Yeah, no problem.

17 Q. See what happened is they
18 gave me one version of the article and
19 printed off the other one.

20 (Whereupon a discussion was
21 held off the record.)

22 BY MR. GEISE:

23 Q. Okay. Turn your attention
24 to Page 107 of Exhibit 8. Do you see

1 there's a paragraph that begins, the
2 increasingly higher risk?

3 A. Yes. The second column.

4 Q. Okay. Yes. And if you look
5 at the bottom of that paragraph, do you
6 see where it says, "However for all
7 generations, the progression from
8 prescription opioids to heroin needs to
9 take cocaine into account, since
10 cocaine" --

11 A. Hold on, I'm not
12 following -- finding this.

13 Q. Okay.

14 A. How far down in the
15 paragraph is it?

16 Q. It's the last sentence of
17 the paragraph.

18 A. Last sentence. I'm sorry,
19 go ahead.

20 Q. It says, "However, for all
21 generations, the progression from
22 prescription opioids to heroin needs to
23 take cocaine into account, since cocaine
24 is an integral part of the progression

1 from NMPO, nonprescription medical
2 opioids, to heroin."

3 Do you see that?

4 A. Yes, I do.

5 Q. Okay. And I think from your
6 earlier answers, you did not take cocaine
7 into account for purposes of your
8 opinions in this section of your report?

9 A. For the -- once again, the
10 goal of the section of the report was in
11 collaboration with the other sections of
12 the report, to show, based on various --
13 various bodies of evidence, that there is
14 a relationship from prescription opioids
15 to illicit opioids. It was not to
16 establish that that was the only
17 relationship.

18 Q. And according to this
19 article from Melanie Wall and others,
20 it -- it indicates that there is a need
21 to take cocaine into account when looking
22 at the prescription -- progression from
23 prescription opioids to heroin, correct?

24 A. That's what they say. I

1 don't know what that means.

2 Q. And --

3 A. I don't know what need --
4 you know, I'm not sure what that means
5 statistically, but that's certainly what
6 the sentence says.

7 Q. Well, whether you need to do
8 it statistically or not, you didn't do
9 it, correct?

10 A. We -- in this -- in our --
11 once again, in our analysis, we, what we
12 did do to try to address any concerns
13 about other drugs playing a role here was
14 show that in the high prescription opioid
15 counties, high prescription -- high
16 shipment counties, where there was an
17 explosion of illicit opioid deaths or to
18 low shipment counties, there was no
19 change, relative change, in non-opioid
20 drug deaths. So that's the way in which
21 we accounted for other drugs in our
22 analysis.

23 Q. Did you look at, among those
24 with opioid mortalities, whether they had

1 prior use of cocaine?

2 A. You cannot know that from a
3 mortality record. That's not knowable,
4 lifetime history of drug use.

5 Q. Did you look in the NSDUH
6 data to see what percentage of heroin
7 users had prior use of cocaine?

8 A. No, I did not.

9 Q. If you can look further
10 below in that -- I guess it's just above
11 the -- the sentence I read you in that
12 paragraph on Page 107 of Exhibit 8. Do
13 you see the sentence that reads, "The
14 increase in the progression from
15 prescription opioids to heroin among
16 millennials compared to older generations
17 may be due not only to increases in high
18 intensity prescription opioid use, but
19 also to the greater availability and
20 affordability of heroin."

21 Do you see that?

22 A. Yes, I do.

23 Q. Do you agree that heroin
24 availability is -- is a variable in

1 increased heroin use?

2 A. Yes. And as I stated
3 before, I believe heroin availability
4 rose because of the thick markets for
5 opioids created by an increase in
6 prescription opioids.

7 Q. Do you agree that heroin
8 affordability is also a variable?

9 A. Yes.

10 MR. KO: Objection. Asked
11 and answered.

12 BY MR. GEISE:

13 Q. Professor Gruber, I want to
14 now talk to you about some of the
15 epidemiological studies that you listed
16 in your report. And in particular, those
17 on Table 1.1.

18 Direct your attention to
19 Paragraph 93 of your report where you
20 write, "Additional small sample
21 epidemiological studies confirm these
22 findings," and you cite a Mateu-Gelabert
23 article there; is that correct?

24 A. Yes.

1 Q. What does it mean when you
2 say it's a small sample epidemiological
3 study?

4 A. Well, small sample is not
5 a -- is -- is not a statistically defined
6 term. I'm just meaning that typically
7 our studies are more reliable the larger
8 sample you bring to bear on the problem.
9 And typically, as an economist, these
10 studies with something like with 46
11 observations as a small sample for a
12 statistical analysis.

13 Q. And the Mateu-Gelabert
14 article involved a sample of 46 people
15 and only considered those in New York
16 City, correct?

17 A. Yes.

18 Q. You also refer to a 2015
19 study by Cicero & Ellis. And their
20 sample was also small and looked at just
21 153 individuals, correct?

22 A. That's correct.

23 Q. So of the five studies you
24 looked at, two of them were small sample

1 studies; is that correct?

2 A. Of the five studies I
3 reference in this table, two are small
4 sample studies.

5 Q. Well, and you can't recall
6 any other studies you looked at, so I'm
7 assuming that means you can't recall the
8 sample size in any study that you don't
9 remember; is that correct?

10 MR. KO: Object to -- object
11 to the form.

12 THE WITNESS: That's
13 correct.

14 BY MR. GEISE:

15 Q. Now, you would agree that
16 none of the five studies you looked at
17 collected data from either Cuyahoga
18 County or Summit County?

19 A. So if you look at my table,
20 the Jones and Muhuri data, I'm
21 familiar -- and that's a national sample,
22 so presumably there could be some
23 observations in there from Cuyahoga and
24 Summit County. I'm not as familiar with

1 the sampling frame for the skip data. So
2 I'm not sure if they might include
3 individuals from Cuyahoga or Summit
4 County.

5 (Document marked for
6 identification as Exhibit
7 Gruber-9.)

8 BY MR. GEISE:

9 Q. Professor Gruber, I'm
10 handing you what's been marked Exhibit 9
11 to your deposition. And this is a 2013
12 article from Christopher Jones entitled
13 "Heroin Use and Heroin Use Risk Behaviors
14 Among Nonmedical Users of Prescription
15 Opioid Pain Relievers: United States
16 2002 to 2004 and 2008 to 2010."

17 Do you see that?

18 A. Yeah.

19 Q. And this is one of the five
20 studies that you looked at for purposes
21 of your report, correct?

22 A. That's correct.

23 Q. If I can direct your
24 attention to Page 99 of the study, the

1 first full paragraph. Do you see
2 where -- I'm sorry. I got ahead of you.

3 The first full paragraph on
4 the right-hand column of Page 99.

5 MR. KO: Steve, we're on
6 Exhibit 9, right?

7 MR. GEISE: Yes.

8 THE WITNESS: Yes, I see it.

9 BY MR. GEISE:

10 Q. Do you see where the --
11 Jones writes, "This study has several
12 limitations. First" --

13 A. One second. Hold on.

14 Q. Yep.

15 A. The first full paragraph on
16 Page 99?

17 Q. On the right-hand column.

18 A. On the right-hand column.

19 I'm sorry. Yes, go ahead.

20 Q. "This study has several
21 limitations. First, NSDUH data are
22 self-reported and their value depends on
23 the truthfulness and accuracy of
24 individual respondents; under or

1 overreporting may occur."

2 Do you see that?

3 A. Yes.

4 Q. You agree with that?

5 A. As I point out in my report,
6 that's a concern many people have raised
7 with NSDUH, and that's why I don't rely
8 on it extensively in my analysis.

9 Q. Jones continues by saying,
10 "Second, the survey is cross-sectional;
11 therefore, assessing causality is not
12 possible."

13 Do you see that?

14 A. Yes. And as we discussed
15 before, that's why I move on from that
16 NSDUH graph, which just compares high and
17 low shipment states, to look at what
18 happened over time in those states.

19 Q. Would you agree that in his
20 own study, Christopher Jones reports that
21 assessing causality is not possible from
22 it, correct?

23 MR. KO: Object to the form.

24 THE WITNESS: I see that

1 what he -- I don't necessarily
2 agree. I don't agree that you
3 cannot assess causality in
4 cross-sectional data. He states
5 that, but I don't agree with that
6 conclusion.

7 BY MR. GEISE:

8 Q. Do you also see further down
9 in that same paragraph, there's a
10 sentence that starts with "therefore,"
11 and again referring to NSDUH, Jones
12 writes, "Therefore, the drug use
13 estimates in this study may not
14 generalize to the total U.S. population.
15 This may be particularly true for
16 estimates of rarely used drugs like
17 heroin."

18 Do you agree with that
19 assessment?

20 A. As I discuss in my report,
21 we know that the NSDUH does not survey
22 particular populations, and that's a
23 limitation. That's why it's critical in
24 my report that I can come at this

1 question from a variety of angles, and I
2 appreciate the honesty of the author in
3 pointing out the limitations in this
4 study. And that's why I wouldn't want to
5 rely in my analysis solely on this study.

6 Q. And despite the fact that
7 the author, in assessing his own study
8 says that assessing causality from it is
9 not possible, you disagree and think that
10 it is possible?

11 MR. KO: Objection.

12 Mischaracterizes the conclusions
13 reached in the report.

14 THE WITNESS: That's not
15 what I said.

16 BY MR. GEISE:

17 Q. Do you think that assessing
18 causality is possible from Jones' study
19 or is not?

20 A. From -- from Jones' study,
21 per se, the study he carries out, I do
22 not believe you can assess causality. My
23 point was that's not a generally true
24 statement about cross-sectional data.

1 But I agree in the study he
2 carries out, this is really establishing
3 a correlational link as we've discussed
4 with this reference to Table 1.1.

5 Q. So with regard to Table 1.1
6 and the Jones study, you agree that all
7 it establishes is correlation and not
8 causation?

9 MR. KO: Object to the form.

10 THE WITNESS: I -- I'm
11 sorry. I missed what you said.

12 MR. KO: I just objected to
13 the form. Go ahead.

14 THE WITNESS: I agree that
15 the Jones study does not establish
16 causality to the standards that I
17 would like.

18 BY MR. GEISE:

19 Q. In the heading to Table 1.1
20 in your report, you use the term
21 "establishing the link."

22 When you say "establishing
23 the link," does that mean establishing
24 correlation or establishing causation?

1 A. I -- when I say establishing
2 the link, what I'm trying to mean is I
3 mean that temporally to show that these
4 studies show that there is a link from --
5 you know, there is a link from the use of
6 prescription opioids to the use of other
7 illicit opioids. I don't mean that to
8 say that these studies are -- are causal
9 evidence of that link.

10 But that -- once again, that
11 doesn't mean that they're useless. That
12 means that one wants to use them in a
13 portfolio of considerations.

14 If -- it is always useful in
15 economic studies, or it's often useful in
16 studies of health economics, to
17 supplement the statistical analysis with
18 understanding of what's going on behind
19 the data that epidemiological studies can
20 provide.

21 (Document marked for
22 identification as Exhibit
23 Gruber-10.)

24 BY MR. GEISE:

1 Q. Professor Gruber, I'm
2 handing you what's been marked Exhibit 10
3 to your deposition. This is a 2013
4 article from Pradip Muhuri and others
5 that is, I think, the second study listed
6 on Table 1.1 in your report; is that
7 correct?

8 A. Let me just double-check.
9 Yes.

10 Q. And I believe you cite to
11 and discuss certain findings in this
12 study in Paragraph 91 of your report; is
13 that correct?

14 A. Yes.

15 Q. As you report in Paragraph
16 91 at the last sentence beginning on the
17 bottom of Page 63, you say, "The authors
18 note that there are many plausible
19 explanations for this finding, including
20 the gateway theory of drug use that
21 posits that the use of some drugs may
22 expose individuals to a répétiteur of
23 biological and behavioral factors that
24 could influence their future use of other

1 drugs."

2 Do you see that?

3 A. Yes.

4 Q. What are the other plausible
5 explanation noted by Muhuri in their
6 study?

7 A. I don't recall exactly.

8 Q. If I can point your
9 attention to the discussion section of
10 the Muhuri article, which I think would
11 be on the 14th page.

12 A. Yes.

13 Q. Have you found that?

14 A. Yep.

15 Q. If you look in the middle of
16 that first paragraph, you see the
17 sentence that you quoted in Paragraph 91
18 of your report, correct?

19 A. Yes.

20 Q. If you look two sentences
21 after that, do you see where Muhuri
22 writes, "Although the findings indicated
23 that NMPR use is a common step on the
24 pathway to heroin initiation, most NMPR

1 users do not progress to heroin use."

2 Do you see that?

3 A. Yes.

4 Q. Do you agree with that?

5 A. I do not know for sure the
6 statistics on that. It seems very likely
7 to me that most would not progress use to
8 heroin use. Heroin use is a much, much
9 lower rate than nonmedical prescription.

10 Q. Do you know what percentage
11 of nonmedical prescription opioid users
12 progress to heroin?

13 A. No, I do not.

14 Q. Muhuri continues, "Second,
15 heroin use appears to be neither a
16 sufficient nor a necessary condition for
17 the subsequent onset of NMPR use."

18 Do you see that?

19 A. Yes.

20 Q. Do you agree with that
21 assessment?

22 A. I don't quite understand the
23 sentence. I mean, I don't quite
24 understand. Because they are talking

1 about the progression to heroin. Now
2 suddenly they are talking about the
3 progression from heroin. And I'd have to
4 read the article more to understand where
5 that fits in. I don't quite understand
6 how that sentence fits their -- fits the
7 article.

8 Q. And then the next sentence
9 says, "Put differently, it appears that
10 there are many unique pathways leading to
11 NMPR use, and many of those do not
12 involve heroin as a developmental
13 precursor or milestone on the career
14 trajectory of an illicit drug user."

15 Do you see that?

16 A. Yes.

17 Q. And I think you told us
18 earlier that -- that you didn't look at
19 any other pathways other than
20 prescription opioid use and heroin,
21 correct?

22 A. That is a pathway that --
23 that is the focus of my review of the
24 epidemiological literature.

1 Q. If you look in the next
2 paragraph in Muhuri's article, about six
3 lines down there's a sentence that reads,
4 "Besides the relationship between
5 prior" --

6 A. One second, sorry.

7 Q. I'm sorry. It begin --

8 A. Six lines down, the second
9 paragraph?

10 Q. It's actually the -- the
11 fifth line down at the very end of that
12 line. It begins --

13 A. Yes, got it.

14 Q. Muhuri writes, "Besides the
15 relationship between prior NMPR use and
16 subsequent heroin use may have been
17 partially accounted for by factors such
18 as availability of pain relievers or
19 heroin supply which we could not examine
20 here."

21 Do you see that?

22 A. Yes.

23 Q. Do you recognize that
24 availability of pain relievers and heroin

1 supply can be other factors in people
2 initiating the use of heroin?

3 A. Once again, two responses to
4 that. One is, the goal of my report is
5 not to comparably explain all the reasons
6 why people use heroin. It's to causally
7 establish that the expansion of
8 prescription drug availability led to use
9 of heroin.

10 Point 1 and Point 2 I'll
11 make again is that even if the use of --
12 even if one of those pathways is through
13 expanded supply, that pathway itself is
14 impacted by the availability of
15 prescription drugs.

16 Q. You agree that Muhuri did
17 not, in their study, did not examine the
18 importance of factors such as the
19 availability of pain relievers or the
20 heroin supply in their study, correct?

21 MR. KO: Object to the form.

22 THE WITNESS: I don't recall
23 the article well enough. But they
24 certainly seem to imply that in

1 that sentence.

2 BY MR. GEISE:

3 Q. Do you agree that these two
4 factors would be omitted variables?

5 A. Well, they are not doing a
6 regression analysis here as far as I
7 know. There -- and so, there's a
8 reason -- there's sort of a wrinkle to
9 the invariable bias discussion we were
10 having before, which is, the way you
11 described an invariable bias before, it
12 would imply you should always include
13 every variable which might be omitted.
14 That's not always true.

15 Like sometimes the variables
16 you might include might actually
17 themselves be caused by the dependent
18 variable. So if the availability of
19 heroin, if the price of heroin for
20 example, or the supply of heroin is
21 caused by shipments of prescription
22 drugs, you wouldn't want to include that
23 in the regression. Even though it's
24 omitted, including it would bias your

1 regression. You can actually make your
2 regression worse, by including the
3 variable itself is caused by the
4 dependent variable. So I think that's --
5 that's some of the difficulty this speaks
6 to. So whether it's omitted, it is not
7 included in their analysis. Whether
8 that's a mistake, that's harder to say.
9 Because if that itself was caused by the
10 availability of prescription drugs, you
11 wouldn't want to include it.

12 Q. If you look at the first
13 page of Muhuri's article, the second
14 paragraph of the introduction. She
15 writes, "This progression may result
16 simply because heroin may be cheaper or
17 easier for them to get in some
18 locations."

19 Do you see that?

20 A. Yes.

21 Q. So, do you know if -- how
22 the ease of availability or the price of
23 heroin compared in Cuyahoga and Summit
24 Counties to other counties in Ohio?

1 A. No, I don't.

2 Q. Do you know how the price of
3 heroin or the ease to get heroin compared
4 in Cuyahoga and Summit County to any
5 counties throughout the nation?

6 A. That's not something I
7 studied, no.

8 (Document marked for
9 identification as Exhibit
10 Gruber-11.)

11 BY MR. GEISE:

12 Q. Professor Gruber, I'm
13 handing you what's marked as Exhibit 11
14 to your deposition. And this is the
15 second of the two Cicero articles that
16 you cite in Table 1.1, correct?

17 A. This is the first of the two
18 I believe that I cite.

19 Q. Okay. That's my bad.
20 You're right. We talked about Jones
21 before. This is the first, this is the
22 2014 Cicero article.

23 A. Yes.

24 Q. We talked about the 2015

1 one. You are correct.

2 I want to talk about some of
3 the findings in Cicero's article in 2014.
4 If you look under -- on the first page
5 under results?

6 A. Oh, the first page.

7 Q. Yes.

8 A. Okay.

9 Q. And the last sentence Cicero
10 writes, "Although the high produced by
11 heroin was described as a significant
12 factor in its selection, it was often
13 used because it was more readily
14 accessible and much less expensive than
15 prescription opioids."

16 Do you see that?

17 A. Yes.

18 Q. And that's similar to what
19 we were discussing in the Muhuri article
20 where they speculated that -- that price
21 and availability are factors in heroin
22 use, correct?

23 A. I believe price and
24 availability are factors in the use of

1 many goods, heroin among them.

2 Q. Do you agree that the high
3 from heroin is a factor in why people
4 choose to use heroin?

5 A. I -- as I -- as I described
6 in my report, I believe the high from
7 opioids is a reason that people choose
8 opioids. Heroin is, especially now that
9 prescription opioids have gotten more
10 difficult to get, a cheaper way to get
11 that high.

12 Q. Do you know how the high
13 from heroin compares to the high from
14 prescription opioids?

15 A. No, I do not, I'm not an
16 expert on that. But I am -- I have
17 reviewed the literature and rely on a
18 number of other experts in this case
19 which -- who discuss the essential
20 substitution, the substitutability of
21 heroin as a means of getting that high of
22 prescription opioids. And indeed, one of
23 the most striking piece of evidence I
24 think is that in the places where heroin

1 is most similar to prescription opioids,
2 that is east of the Mississippi, the
3 white heroin east of the Mississippi, as
4 opposed to the black tar heroin west of
5 the Mississippi is where we saw the
6 largest rise of heroin use and deaths.

7 Q. Tell me what you know about
8 the heroin consumption in Cuyahoga
9 County. What's the most predominant form
10 of heroin in Cuyahoga County?

11 A. The most predominant form of
12 heroin I believe is -- is white heroin.

13 Q. Have you studied that?

14 A. I have not studied that in
15 Cuyahoga County in particular.

16 Q. Have you studied that in
17 Summit County?

18 A. Not in particular, no.

19 Q. Now, Cicero's study, the
20 2014 study, it looked at those 18 years
21 or older who met the DSM-IV criteria for
22 substance abuse with a primary drug that
23 was an opioid, correct?

24 A. Can you point me to where --

1 Q. Sure. If you look under the
2 methods section on the second page.
3 Midway down the first paragraph it says,
4 "Participants must be 18 years of age or
5 older and must meet DSM-IV criteria for
6 substance abuse with a primary drug that
7 is an opioid prescription drug or
8 heroin."

9 Do you see that?

10 A. Yes, I do.

11 Q. Do you know what percentage
12 of users in any given year meet the
13 DSM-IV criteria for substance abuse for
14 both prescription opioids and heroin?

15 A. No, I don't.

16 Q. Do you know what percentage
17 of users of prescription opioids met the
18 DSM-IV criteria for substance abuse
19 before using heroin for the first time?

20 A. No, I don't.

21 Q. If you can turn your
22 attention to the fourth page of
23 Exhibit 11. The bottom paragraph that
24 begins, "As shown in Figure 2."

1 Do you see that?

2 A. Yes.

3 Q. The second sentence in that
4 paragraph says, "The ethnicity of heroin
5 users seeking treatment also showed a
6 marked shift from nearly equal white to
7 non-white ratios in the 1960s to a
8 dominance of white users (90.3 percent)
9 by 2010."

10 Do you see that?

11 A. Yes.

12 Q. Do you know the ethnic
13 composition of Cuyahoga County?

14 A. I do not know that
15 particularly.

16 Q. Do you know the ethnic
17 composition of Summit County?

18 A. No, not particularly.

19 Q. Do you know the ethnic
20 breakdown among users of prescription
21 opioids in either county?

22 A. No, I don't.

23 Q. Do you know the ethnic
24 breakdown of those who had an

1 opioid-related mortality in either of
2 those counties?

3 A. Not offhand, no, I don't.

4 Q. If you turn to the seventh
5 page of Exhibit 11. In the paragraph
6 above the heading "conclusions."

7 Do you see where I'm
8 referring?

9 A. Yes.

10 Q. The paragraph starts, "There
11 are important limitations to our studies.
12 In terms of our treatment base sample,
13 one could speculate whether or not this
14 population is representative of those
15 using opioids recreationally,
16 particularly those who had access to the
17 internet in order to participate in our
18 web-based follow-up."

19 Do you see that?

20 A. Yes.

21 Q. Do you agree that Cicero, in
22 their study, questioned if the population
23 in their study could be extrapolated to
24 the population at large, including those

1 who use opioids recreationally?

2 MR. KO: Object to the form.

3 THE WITNESS: That seems --

4 that's the way I would interpret
5 the second sentence.

6 BY MR. GEISE:

7 Q. Do you agree that the
8 shipment data that you've been using as a
9 proxy for consumption would include those
10 who use opioids recreationally?

11 A. Yes, certainly it does.

12 Q. In Paragraph 51 of your
13 report that I think we talked about
14 earlier today. This is where you were
15 talking about the substitution of illicit
16 opioids for prescription opioids?

17 A. Yes.

18 Q. In this paragraph, you talk
19 about individuals who had become addicted
20 to prescription opioids and then turned
21 to substitute products, correct?

22 A. Yes, at the bottom of the
23 paragraph.

24 Q. So do you agree that this

1 opinion would not apply to users of
2 prescription opioids who, instead of
3 being addicted, are recreational users?

4 MR. KO: Object to the form.

5 THE WITNESS: I don't
6 understand the question.

7 BY MR. GEISE:

8 Q. If this paragraph applies to
9 those who are addicted to prescription
10 opioids, would you agree it doesn't apply
11 to those who are not addicted?

12 A. No, I can't agree to that.

13 Q. If a reason that you point
14 out in Paragraph 51 that somebody would
15 switch from a prescription opioid to
16 heroin is because of an addiction -- am
17 I -- do you follow me so far?

18 A. That's one reason, yes.

19 Q. Okay. You would agree that
20 if somebody is not addicted, then
21 addiction obviously cannot be a reason
22 for making a switch between prescription
23 opioids to heroin?

24 MR. KO: Object to the form.

1 THE WITNESS: I mean, that's
2 a really hard question to answer.
3 You know, it could be --

4 BY MR. GEISE:

5 Q. Is it?

6 A. Yes, it is. So it could be
7 the addiction of a family member, which
8 causes them to switch from being a
9 recreational user to addicted to opioids.
10 So let's say addiction doesn't play a
11 role --

12 Q. Well, I didn't -- I don't
13 think I said addiction doesn't play a
14 role. Let me ask it this way.

15 Do you agree an individual
16 who is not addicted to prescription
17 opioids would not switch to heroin
18 because of their own addiction --

19 MR. KO: Object to the form.

20 BY MR. GEISE:

21 Q. -- to prescription opioids?

22 MR. KO: Object to the form.

23 THE WITNESS: If they're not
24 addicted, then yes, I don't see

1 them switching due to addiction
2 because they're not addicted.

3 BY MR. GEISE:

4 Q. Have you done any analysis
5 to determine what percentage of
6 prescription opioid users meet the DSM-IV
7 criteria for opioid use disorder?

8 MR. KO: Objection. Asked
9 and answered.

10 THE WITNESS: No, I've not.

11 (Document marked for
12 identification as Exhibit
13 Gruber-12.)

14 BY MR. GEISE:

15 Q. Professor Gruber, I'm
16 handing you what's been marked as
17 Exhibit 12 to your deposition. This is
18 an article entitled "Injection and Sexual
19 HIV/HCV Risk Behaviors Associated With
20 Nonmedical Use of Prescription Opioids
21 Among Young Adults in New York City."

22 Do you see that?

23 A. Yes.

24 Q. The lead author on this

1 paper is Pedro Mateu-Gelabert?

2 A. Yes.

3 Q. And apologies to Pedro if I
4 butchered his last name. But this is
5 also one of the studies that you
6 identified on Table 1.1 of your report,
7 correct?

8 A. Yes.

9 Q. I want you to turn your
10 attention to Page 15 of Exhibit 12, the
11 bottom paragraph. The authors write,
12 "These results should be interpreted with
13 caution in light of several limitations."

14 Do you see that?

15 A. Yes.

16 Q. Did you interpret their
17 results with caution?

18 A. Yes.

19 Q. Okay. The next sentence
20 reads, "Because this is a qualitative
21 study based on interviews conducted with
22 a relatively small number of participants
23 who were sampled via non-problalistic
24 methods, the results are not intended to

1 be generalizable to all young adult
2 nonmedical PO users."

3 Do you see that?

4 A. Yes.

5 Q. If we go two sentences down,
6 they write, "We used quantitative data to
7 precisely characterize our data, not to
8 make statistical inferences about a
9 larger population."

10 Do you see that?

11 A. Yes.

12 Q. Is that an indication from
13 these authors that they did not think
14 that their data should be used to make
15 inferences about a larger population?

16 MR. KO: Object to the form.

17 THE WITNESS: I'm not --
18 that's -- they may or may not
19 think that.

20 BY MR. GEISE:

21 Q. Well, they wrote that,
22 correct?

23 A. No. They wrote -- precisely
24 categorize...is not to make statistical

1 inference about a larger population.

2 I believe your question was
3 did the authors believe those inferences
4 should not be drawn. They don't state,
5 whether they believe that or not.

6 Q. Okay. Now, you see the last
7 sentence of this section says, "Our
8 qualitative research provides insight
9 into the social context in which
10 nonmedical PO use occurs and will
11 hopefully provide" --

12 A. Hold on. I'm lost. Sorry.
13 My mind is baked.

14 Q. That's okay. If you go down
15 to that --

16 A. Page 15.

17 Q. It'd be Page 16 now.

18 A. Oh, Page 16 now. I see.
19 That's what I missed.

20 Q. The last paragraph.

21 A. Okay, gotcha.

22 Q. Okay. And it says -- well,
23 let's just do the whole thing. "This
24 study demonstrates the importance of

1 understanding nonmedical PO use among
2 young adults in its role as a pathway to
3 heroin use, injection drug use, and
4 increased vulnerability to HIV and HCV."

5 Do you see that?

6 A. Yes.

7 Q. And then it says, "Our
8 qualitative research provides insights
9 into the social context in which
10 nonmedical PO use occurs and will
11 hopefully provide a useful platform upon
12 which future quantitative studies and
13 intervention efforts can build."

14 Do you see that?

15 A. Yeah.

16 Q. Now, you are using this
17 small study as part of forming a basis
18 for an opinion in a case about two
19 studies in Ohio, correct?

20 MR. KO: Objection.

21 Mischaracterizes the study. I
22 believe Professor Gruber described
23 this is a small statistical sample
24 that he drew from, not a small

1 study.

2 MR. GEISE: Okay. I'll
3 rephrase it.

4 BY MR. GEISE:

5 Q. You are using this, this
6 study that you've described as a small
7 statistical sample in New York for
8 purposes of a case involving two counties
9 in Ohio, correct?

10 A. I'm using it as part of a
11 suite of evidence that I'm developing.
12 It's one of five studies in one of three
13 different parts of the argument. So yes,
14 it is used in that context.

15 Q. And when you sat down with
16 Professors Cutler and McGuire to look at
17 what materials you were going to gather
18 to support your opinions in this case,
19 did you suggest doing a statistically
20 small sample in Cuyahoga or Summit
21 County, testing similar things that
22 Mateu-Gelabert did in this study?

23 MR. KO: Object to the form.
24 Also I'll give you the same

1 instruction that I gave earlier
2 today. To the extent that counsel
3 were involved in these discussions
4 with you, Professor Cutler and
5 Professor McGuire, I instruct you
6 not to answer.

7 THE WITNESS: Yeah, so I
8 think I can't get into that
9 detail.

10 BY MR. GEISE:

11 Q. Did you ever suggest doing a
12 small statistical sample in Cuyahoga or
13 Summit County?

14 MR. KO: To whom?

15 BY MR. GEISE:

16 Q. To Cutler or McGuire.

17 MR. KO: Same instruction.

18 THE WITNESS: And same
19 answer.

20 BY MR. GEISE:

21 Q. Are you aware of a
22 statistical sample being conducted in
23 Cuyahoga or Summit County along the lines
24 of that performed by Mateu-Gelabert?

1 A. No, I'm not aware of that.

2 (Document marked for
3 identification as Exhibit
4 Gruber-13.)

5 BY MR. GEISE:

6 Q. Professor Gruber, I'm
7 handing you Exhibit 13 to your
8 deposition. And I believe this is the
9 last of the five studies that you
10 identify in Table 1.1; is that correct?

11 This should be Cicero 2015.

12 A. Yes.

13 Q. And like the Mateu-Gelabert
14 study I believe you also referred to --

15 A. No, I'm -- I'm sorry.

16 Q. I'm sorry?

17 A. This is not. This is 2014.

18 It says '15 here, but this is the -- this
19 is the -- this uses the skip data.

20 I'm not sure if this is --
21 this may be another version, 2014. This
22 definitely isn't the last -- I'm not sure
23 what this is. 2014.

24 So this is Cicero -- this is

1 Cicero & Ellis.

2 Q. Correct.

3 A. We -- we have two Cicero --
4 I refer to two Cicero et al. studies.

5 Q. We looked at the Cicero 2014
6 before. That was Exhibit 11, correct?

7 A. Yeah. And this is not --

8 Q. Well, if you look at your --

9 A. Hold on. Hold on one
10 second.

11 Q. I'm sorry.

12 A. Yeah, one second. I'm
13 sorry. I just have to clarify. There's
14 a lot of studies here, so give me a
15 moment.

16 Yes, I'm sorry, that is,
17 that is the right study.

18 But, I think it's -- I --
19 the reason I'm concerned, is it's perhaps
20 a typo in my report, but the -- the
21 abstract talks about an N of 244. And my
22 report talks about an N of 153. And so
23 that -- that concerns me. This looks
24 like the right study, but I'm a little

1 bit concerned that those numbers are off.
2 And it -- it may be a typo in my report,
3 I'm not entirely sure.

4 Q. I will tell you if there's
5 another Cicero 2015 study we didn't find
6 it.

7 A. Okay.

8 Q. So I believe this is it
9 but this talks --

10 A. This looks like -- this
11 looks like the right study, but let me
12 just note for the record that I'm -- I'm
13 a little concerned with this
14 misalignment. But I'll presume it's just
15 a typo in my report and we'll move ahead.

16 Q. And we'll still -- we'll
17 talk about the -- the study and we won't
18 worry too much about the -- the size of
19 the N in the data source.

20 Okay?

21 A. Okay.

22 Q. If you look at -- well,
23 first of all, this is entitled "Abuse
24 Deterrent Formulations and the

1 Prescription Opioid Abuse Epidemic in the
2 United States: Lessons learned from
3 OxyContin," correct?

4 A. Hold on. There is an easy
5 way to do this, which is let's look at
6 the bibliography.

7 MR. KO: Or --

8 THE WITNESS: It's this one?

9 MR. KO: -- to try and
10 clarify, it's also -- rather than
11 looking at the table and the
12 bullets to your narrative prior to
13 the table, it's listed.

14 But you can look at the
15 bibliography too.

16 THE WITNESS: Yes, this is
17 the right study.

18 Okay. I'm sorry, go ahead.

19 BY MR. GEISE:

20 Q. So I -- first of all, what
21 do you understand abuse deterrent
22 formulation to mean?

23 A. My understanding of abuse
24 deterrent formulation of OxyContin, I --

1 you're saying the general term "abuse
2 deterrent formulation"?

3 Q. Yeah.

4 A. That it's a reformulation of
5 a drug, although I guess it could be of
6 other types of substances as well, to try
7 to still deliver the same medical
8 efficacy while reducing the odds of
9 abuse.

10 Q. Direct your attention to the
11 second page of the exhibit, the first
12 page of the study, you see -- oh, you had
13 it, I'm sorry. I -- I crossed you up.
14 First page.

15 A. First page?

16 Q. Yes. You see where it says
17 objective?

18 A. Yes.

19 Q. Okay. Next to objector --
20 objective the authors state, "To examine
21 the factors that led to the initial steep
22 decline in OxyContin abuse and the
23 substantial levels of residual abuse that
24 have remained relatively stable since

1 2002."

2 Do you see that?

3 A. 2012.

4 Q. 2012. I'm sorry.

5 MR. KO: 2012.

6 BY MR. GEISE:

7 Q. Do you see that?

8 A. I see that.

9 Q. If you look at Table 1.1,
10 your chart that accompanies this study,
11 under questions studied, you describe it
12 as "effect of introduction of the abuse
13 deterrent formulation of OxyContin on
14 heroin use."

15 Do you see that?

16 A. Yes.

17 Q. Now, the authors provide a
18 different objective to what their study
19 was designed to address, correct?

20 A. Yes. They state -- they
21 state it differently than it's stated in
22 the table.

23 But what's in the table is
24 part of what they find. So that's sort

1 of the -- the part of the report we're
2 focusing on here.

3 Q. Professor Gruber, I want to
4 turn your attention to Paragraph 89 of
5 your report. And you state, "Several
6 epidemiological studies establish a link
7 between prescription opioids and heroin
8 use." And then you say, "These studies
9 establish that prescription opioids have
10 become the predominant gateway to heroin
11 use, a pattern not observed in earlier
12 decades."

13 Do you see that?

14 A. Yes.

15 Q. And you continue by saying,
16 "Unless the illicit opioid crisis is a
17 direct result of defendants' misconduct."

18 Do you see that?

19 A. Yes.

20 Q. Now, do any of the five
21 studies upon which you rely mention
22 anything about the defendants' conduct or
23 misconduct?

24 A. Not that I recall, no.

1 Q. Do any of the five studies
2 address manufacturers' shipments of
3 prescription opioids?

4 A. I don't know what you mean
5 by address. Can you maybe be clearer of
6 what you're asking? I don't understand.

7 Q. Mention, discuss?

8 A. I don't recall if they do.

9 Q. Do any of the five studies
10 mention or discuss the distributors'
11 shipments of prescription opioids?

12 A. I don't recall.

13 Q. Do you agree that the
14 studies upon which you rely do not
15 examine the causal effect of any conduct
16 by the defendants?

17 MR. KO: Object to the form.

18 THE WITNESS: Once again,
19 the -- the -- there's two elements
20 wrapped up in that statement.
21 There's the question of causal and
22 the question of defendants.

23 As we said, these are not
24 causal studies, the standards of

1 the economics literature. They
2 are part of a suite of evidence
3 I'm developing that show
4 epidemiologically why a link makes
5 sense of the type that I'm sort of
6 showing statistically the
7 economics analysis.

8 The second question is
9 defendants. I don't believe they
10 focus specifically on the
11 defendants, but the defendants do
12 represent the majority of opioid
13 manufacture and shipment. And
14 they do in at least some studies,
15 like the one we just looked at,
16 talk about a drug produced
17 primarily by the defendants, if
18 not exclusively, in OxyContin.

19 BY MR. GEISE:

20 Q. You said that the studies
21 you look at show that the link makes
22 sense. Do you recall using that term?

23 A. Yes.

24 Q. Okay. Would you agree that

1 even if the studies show that the link
2 makes sense, these studies themselves do
3 not prove a causal relationship?

4 A. These studies do not prove a
5 causal relationship to the standards that
6 we use in economics literature.

7 Q. So looking specifically at
8 this sentence and Paragraph 89 of your
9 report, Professor Gruber, isn't it
10 incorrect to say that these studies
11 establish that prescription opioids have
12 become the predominate gateway to heroin
13 use, a pattern not observed in earlier
14 decades, and thus that the illicit opioid
15 crisis is a direct result of defendants'
16 misconduct?

17 MR. KO: Object to the form.

18 THE WITNESS: I don't think
19 so.

20 BY MR. GEISE:

21 Q. Would you agree that these
22 studies, the five studies that you looked
23 at, do not discuss the defendants'
24 misconduct or alleged misconduct at all?

1 MR. KO: Objection. Asked
2 and answered.

3 THE WITNESS: Once again, I
4 don't recall if they discussed the
5 defendants. They do focus on the
6 role of prescription opioids which
7 are primarily manufactured and
8 distributed by defendants.

9 BY MR. GEISE:

10 Q. Would you agree that these
11 studies cannot be used to establish that
12 the illicit opioid crisis is a direct
13 result of defendants' misconduct?

14 MR. KO: Object to the form.
15 Asked and answered. Also to
16 clarify, "these studies," we're
17 talking about the studies -- the
18 five studies, correct?

19 MR. GEISE: Correct.

20 THE WITNESS: Once again,
21 what these studies do is show the
22 mechanism through which the use of
23 prescription opioids, which the
24 defendants are the primary

1 manufacturer and distributors, was
2 a pathway to the use of illicit
3 opioids.

4 BY MR. GEISE:

5 Q. But that doesn't -- those
6 studies don't talk at all about -- they
7 don't label the defendants' activities as
8 misconduct at all, correct?

9 MR. KO: Objection. Asked
10 and answered.

11 THE WITNESS: I don't
12 recall.

13 BY MR. GEISE:

14 Q. Do you agree that this
15 sentence in Paragraph 89 of your report
16 overstates what those five studies
17 establish regarding the defendants'
18 conduct?

19 MR. KO: Object to the form.

20 THE WITNESS: Read -- read
21 individually, it seems an
22 overstatement. But I think if you
23 put it in the context of the
24 report, I -- as I said, I rely on

1 Professor Rosenthal's report to
2 talk about the link from
3 misconduct to the shipments of
4 opioid. This is part of a body of
5 evidence that shows the link
6 between shipments of opioids and
7 illicit opioid use. And,
8 therefore, you put those two
9 together, and that is the basis
10 for that sentence.

11 BY MR. GEISE:

12 Q. Where that sentence is
13 contained within your report in Paragraph
14 89, your answer just referred to more
15 than just those five studies, correct?

16 A. Yes, it did.

17 Q. And you would agree that you
18 don't refer to Professor Rosenthal's
19 report in your Table 1.1 when you talk
20 about the five studies that you looked
21 at?

22 A. That's right.

23 Q. And the five studies that
24 you looked at only examined one possible

1 pathway to heroin use, correct?

2 MR. KO: Object to the form.

3 THE WITNESS: No. I mean,
4 as you, yourself, have pointed
5 out, they discuss -- they discuss
6 and study -- I believe if we look
7 back at the studies, there's
8 reference to multiple pathways. I
9 don't recall how explicitly those
10 other pathways were studied.

11 BY MR. GEISE:

12 Q. And even if there is a
13 reference in those other studies about
14 other potential pathways, I think you
15 told us before that you did not study
16 those other potential pathways to be able
17 to offer an expert opinion about them,
18 correct?

19 A. I did not.

20 MR. KO: Object to the form.

21 MR. GEISE: We've been going
22 about an hour. I think we might
23 be switching up here. Let's take
24 a break.

1 THE VIDEOGRAPHER: The time
2 is 4:09 p.m. We are off the
3 record.

4 (Short break.)

5 THE VIDEOGRAPHER: The time
6 is 4:23 p.m. We are on the
7 record.

8 BY MR. GEISE:

9 Q. Professor Gruber, I had a
10 chance to go back and look at an answer
11 that you gave to a recent question before
12 we took a break. And I just want to
13 clarify something.

14 I think you said that you
15 rely on Professor Rosenthal's report to
16 talk about the link of misconduct to the
17 shipment of opioids. Was that accurate?

18 A. Well, that's what I rely on
19 for that -- for that part of the
20 conclusion. The truth is the Professor
21 Rosenthal's -- of course, her report uses
22 different data than mine. It doesn't use
23 the ARCOS data. It uses data from
24 marketing to a different measure of

1 prescription that comes from IQVIA data.

2 Once again, as we discussed
3 before, these are different proxies for
4 the same thing that we're trying to get
5 at, which is opioid use.

6 Q. As I understand your
7 opinions today, you discuss about
8 shipments as a proxy for -- for
9 consumption, and the association with
10 harms. Is that -- it's very broad, but
11 is that accurate?

12 A. That's accurate.

13 THE WITNESS: Go ahead.

14 MR. KO: Object to the form.

15 BY MR. GEISE:

16 Q. And I think from the answer
17 referring to Professor Rosenthal's
18 report, do you then leave the misconduct
19 judgment to Professor Rosenthal, how that
20 relates to shipment?

21 A. I don't discuss misconduct.
22 I only reference her report here.

23 Q. And that may be the better
24 way of me phrasing that question. You

1 don't discuss defendants' alleged
2 misconduct in your report, correct?

3 MR. KO: Objection. Asked
4 and answered.

5 THE WITNESS: My report
6 draws on Professor Rosenthal's
7 discussion.

8 BY MR. GEISE:

9 Q. You yourself didn't form an
10 opinion about whether the defendants
11 engaged in misconduct?

12 A. I don't express an opinion
13 in this report on that topic.

14 Q. I want to turn to Page 68 of
15 your report and Heading B that says the
16 economic literature recognizes that the
17 increase in heroin mortality after 2010
18 is attributable to shipments of
19 prescription opioids.

20 Do you see that?

21 A. Yes.

22 Q. Now, that heading is a
23 pretty -- pretty broad and global
24 statement, "the economic literature."

1 Do you see that?

2 A. Yes.

3 Q. Would it be more accurate to
4 say that some economic literature
5 recognizes that?

6 MR. KO: Object to the form.

7 THE WITNESS: I would say
8 maybe a more accurate -- the
9 relevant economic literature
10 recognizes that.

11 BY MR. GEISE:

12 Q. Now, in this section of your
13 report, I believe you cite to three
14 different studies, an Evans study, an
15 Alpert study, and then the last one is a
16 Powell study; is that correct?

17 A. Yes.

18 Q. In looking at these studies,
19 they do not necessarily discuss shipments
20 of prescription opioids; is that correct?

21 A. I don't think that's
22 correct.

23 Q. Okay. We'll look at them
24 individually then.

1 Turning your attention to
2 Paragraph 95 of your report. In the
3 first sentence, you say, "As demonstrated
4 above, the rapid growth of mortality from
5 illicit opioids nationally coincided with
6 the reduction in aggregate sales of
7 prescription opioids after 2010."

8 Do you see that?

9 A. Yes.

10 Q. Now, when you use the term
11 "coincided" here, do you mean coincided
12 in time?

13 A. Yes.

14 Q. As shipments went down,
15 mortality went up?

16 A. Nationally as shipments --
17 post 2010, shipments were going down, as
18 mortality from illicit opioids was going
19 up, because individuals, as I've
20 discussed before, individuals substituted
21 from their prescription opioids to
22 illicit opioids after 2010.

23 Q. As we discussed before, I
24 think we referred to this as a negative

1 correlation after 2010, that shipments
2 went down and mortality went up?

3 MR. KO: Object to the form.

4 THE WITNESS: That's right.

5 BY MR. GEISE:

6 Q. The second sentence of
7 Paragraph 95 provides, "A variety of
8 economic studies have previously
9 established the causal relationship
10 between the increase in heroin-related
11 mortality between 2010 and either 2012 or
12 2013, and defendants earlier shipments of
13 prescription opioids, as well as the
14 reduction in sales after 2010."

15 Do you see that?

16 A. Yes.

17 Q. And to clarify, are you
18 asserting that the studies establish that
19 heroin mortality, for a period starting
20 in 2010, was related to two factors,
21 prescription shipments before 2010 and a
22 reduction in sales after 2010?

23 MR. KO: Object to the form.

24 THE WITNESS: No. To

1 clarify what I'm saying is that
2 it's related to prescription
3 shipments through 2010 and a
4 series of actions that led to a
5 reduction in sales after 2010.

6 BY MR. GEISE:

7 Q. Now, in Paragraph 95, you
8 make mention of a variety of studies.
9 Are there other studies that purportedly
10 establish this causal relationship in
11 addition to the three that you discuss in
12 Subsection B that begins on Page 68?

13 MR. KO: Object to the form.

14 THE WITNESS: Not that I'm
15 aware of, but this is --
16 economists have sort of come to
17 this literature somewhat later
18 than epidemiologists. You see the
19 articles are recent. It is a
20 growing literature. There may be
21 recent articles of which I'm not
22 yet aware.

23 BY MR. GEISE:

24 Q. So in terms of, when you use

1 the heading "the economic literature,"
2 you're really referring to these three
3 articles?

4 A. The -- how will you say, the
5 extant relevant economic literature.

6 Q. Okay. We can say that.

7 And the extant relevant
8 economic literature consists of three
9 articles?

10 A. That's absolutely right.

11 Q. Let's look first at the
12 Evans article. I'm handing it to you,
13 Professor Gruber.

14 (Document marked for
15 identification as Exhibit
16 Gruber-14.)

17 BY MR. GEISE:

18 Q. It's marked as Exhibit 14 to
19 your deposition.

20 And you discuss the findings
21 from this article in Paragraph 96 of your
22 report, correct?

23 A. Yes.

24 Q. And just for the record, the

1 title of this is "How the Reformulation
2 of OxyContin Ignited the Heroin
3 Epidemic."

4 And it's from March of 2019,
5 and it's written by William Evans, Ethan
6 Lieber, and Patrick Power, correct?

7 A. This draft is from March of
8 2018. It's going to be published in
9 2019. I believe I referenced the -- I
10 sort of future referenced it. I
11 referenced it as 2019 because that's the
12 date in which it -- it's been accepted to
13 be published.

14 Let me go look at the
15 references. It may have actually -- I
16 worked from the version you showed me.

17 Q. Okay.

18 A. It has subsequently been
19 published.

20 Q. It has.

21 A. But it's fine to refer to
22 this version.

23 Q. And I have both of them.
24 And there's not a substantive difference.

1 So let -- we'll work off the -- the
2 version I gave you as Exhibit 14.

3 Professor Gruber, this study
4 doesn't seek to attribute heroin
5 mortality to shipments of prescription
6 opioids, correct?

7 A. Well, it -- I -- I believe
8 the study talks about shipments as, if
9 you will, a mediating factor in the chain
10 of causation that they discuss. Which
11 is, as discussed in this study, areas
12 with higher shipments saw the largest
13 growth in heroin use after OxyContin was
14 reformulated. So the study does involve
15 using shipments data.

16 Q. If you look at the first
17 sentence of the abstract, the authors
18 write, "We attribute the recent
19 quadrupling of heroin death rates to the
20 August 2010 reformulation of an
21 oft-abused prescription opioid,
22 OxyContin," correct?

23 A. Yes.

24 Q. And if you look to the

1 second page of Exhibit 14 which is
2 Page Number 1 at the bottom. It's the
3 second page in the exhibit.

4 A. Mm-hmm.

5 Q. At the bottom, bottom
6 paragraph, do you see where the authors
7 write, "In this paper we argue that the
8 rapid rise in the heroin death rate since
9 2010 is largely due to the reformulation
10 of OxyContin, an opioid introduced in
11 1996"?

12 A. Yes, I do.

13 Q. So this paper by Evans
14 considered the impact of the
15 reformulation of a single opioid,
16 OxyContin, correct?

17 A. That's correct.

18 Q. You agree that the study did
19 not attempt to establish a relationship
20 between global opioid shipments other
21 than OxyContin and heroin mortality,
22 correct?

23 MR. KO: Object to the form.

24 THE WITNESS: One -- one

1 moment. Yes, that's correct.

2 BY MR. GEISE:

3 Q. If I could direct your
4 attention to Page 4 of Exhibit 14. The
5 first complete sentence at the top of the
6 page says, "The Food and Drug
7 Administration has promoted the
8 development of abuse deterrent opioids to
9 pharmaceutical companies and worked with
10 manufacturers to bring these products to
11 market as quickly as possible."

12 Do you see that?

13 A. Yes.

14 Q. And were you aware that the
15 FDA promoted the development of abuse
16 deterrent opioids?

17 A. Yes, I was.

18 Q. Continuing, Evans writes,
19 "Recently the FDA listed the development
20 of ADFs a national policy priority. Five
21 states have adopted laws requiring
22 insurance companies to cover ADFs and
23 similar laws have been proposed in 15
24 other states."

1 Do you see that?

2 A. Yes.

3 Q. Are you aware that the FDA
4 has listed the development of ADFs as a
5 national policy priority?

6 A. I -- I am -- I don't know
7 about that particular title. I'm aware
8 the FDA promoted the idea of ADFs.

9 Q. Do you have an opinion that
10 the FDA bears any responsibility for
11 negative consequences that flow from
12 ADFs?

13 MR. KO: Object to the form.

14 THE WITNESS: No, I don't.

15 BY MR. GEISE:

16 Q. You don't think the FDA
17 bears any responsibility?

18 MR. KO: Object to the form.

19 THE WITNESS: No.

20 BY MR. GEISE:

21 Q. Do states requiring
22 insurance companies to cover ADFs bear
23 any responsibility for negative
24 consequences flowing from them?

1 MR. KO: Object to the form.

2 THE WITNESS: No, I don't --

3 no, they don't.

4 BY MR. GEISE:

5 Q. If you look at the next
6 paragraph of Evans study, they write, "We
7 also present evidence that a number of
8 alternative explanations do not appear
9 capable of generating the patterns found
10 in the data. The adoption of
11 prescription drug monitoring programs and
12 the rise of the potent synthetic opioid
13 fentanyl likely have important effects on
14 the markets for opioids and heroin, but
15 do not seem to be the driving force
16 behind the abrupt growth in heroin death
17 rates starting in 2010."

18 Do you see that?

19 A. Yes.

20 Q. And I think we talked before
21 about the adoption of prescription drug
22 monitoring programs, correct?

23 A. Correct.

24 Q. If we can turn to Page 5.

1 Actually turn to Page 9.

2 And you see at the top of
3 Page 9, beginning on Page 8, the authors
4 summarize some of the available
5 literature that looks at people switching
6 to heroin.

7 Do you see that?

8 A. Yes.

9 Q. Okay. Now, you were aware
10 of, obviously, the Evans study, correct?

11 A. Yes.

12 Q. Because you cited it, right?

13 A. Yes.

14 Q. And if you see at the end of
15 the bottom of Page 8 where they list a
16 number of studies that look at heroin
17 use, one of them that they cite is the
18 Compton paper from 2016 that we looked at
19 as Exhibit 5.

20 Do you recall that?

21 A. Yes.

22 Q. Now, when you read -- did
23 you read the Evans paper in its entirety?

24 A. Yes, I did.

1 Q. When you read it and saw
2 these sites, did you ask your team of
3 researchers to get the underlying cites
4 that Evans cited?

5 A. I did not make a separate
6 request separate from my asking them to
7 do the literature review.

8 Q. So the Compton article that
9 we looked at as Exhibit 5 was actually
10 mentioned in the Evans study you have,
11 correct?

12 A. Correct.

13 Q. But you don't have any
14 recollection of actually looking at that
15 Compton article?

16 A. No, I don't.

17 Q. If we look midway through
18 the paragraph on the top of Page 9, you
19 see where the authors write, "In the
20 population of people that use pain
21 medicine recreationally, few eventually
22 moved to heroin."

23 Do you see that?

24 A. Yes.

1 Q. It continues, "Looking at
2 data from the third quarter of 2010
3 through the end of 2014 in the annual
4 NSDUH, among respondents that have used
5 pain medicine recreationally over the
6 past year, less than 1 percent said they
7 ever used heroin."

8 Do you see that?

9 A. Yes.

10 Q. Do you agree with that data?

11 A. As we've talked about the
12 limitations of the NSDUH, but I think
13 it's -- it's the best data nationally for
14 that, as well as for the next fact that's
15 cited about the fact that most of the
16 people that use heroin report a younger
17 use age of initiation for pain medicine
18 use than for heroin.

19 Q. And the next sentence says,
20 "However, over the same period 79 percent
21 of people that used heroin in the past
22 30 days report a younger age of
23 initiation for recreational pain medicine
24 use than their initiation age for

1 heroin." Is that correct?

2 A. Yes.

3 Q. And again, you haven't
4 studied other potential substances that
5 people had earlier ages of initiation for
6 before their initiation age for heroin,
7 correct? Is that a mouthful?

8 A. Yeah, that's a mouthful.

9 Q. Okay. You pointed out this
10 sentence that talks about 79 percent of
11 people that used heroin in the past
12 30 days report a younger age of
13 initiation for recreational pain
14 medicine, correct?

15 A. Yes.

16 Q. Do you know what percentage
17 of those people that used heroin in the
18 past 30 days report a younger age of
19 initiation for cocaine?

20 A. No, I don't.

21 Q. Do you know the answer for
22 marijuana?

23 A. No, I don't.

24 Q. Do you know the answer for

1 binge drinking?

2 A. No, I do not.

3 Q. Now, Evans in this article
4 talks about the reformulation of
5 OxyContin, correct?

6 A. That's correct.

7 Q. Do you agree that the
8 distributors defendants in this case had
9 no involvement in the reformulation of
10 OxyContin?

11 MR. KO: Object to the form.
12 Foundation.

13 THE WITNESS: I don't -- can
14 you repeat the question.

15 BY MR. GEISE:

16 Q. Yeah. Do you agree that the
17 distributor defendants in this lawsuit
18 had no involvement in the reformulation
19 of OxyContin?

20 MR. KO: Object to the form.
21 Object as to foundation.

22 THE WITNESS: I -- clearly
23 the reformulation of OxyContin was
24 done by the manufacturers. I

1 don't know if the distributors had
2 no role. I don't -- I don't know
3 that the underlying mechanics of
4 the process well enough in the
5 history of how it happened.

6 BY MR. GEISE:

7 Q. Are you aware of whether the
8 distributors had any role in the
9 reformulation of OxyContin?

10 MR. KO: Same objections.

11 THE WITNESS: I'm not.

12 BY MR. GEISE:

13 Q. Are you aware of whether the
14 pharmacy defendants in this lawsuit had
15 any involvement in the reformulation of
16 OxyContin?

17 MR. KO: Same objections.

18 THE WITNESS: No, I'm not.

19 BY MR. GEISE:

20 Q. Is it accurate to say that
21 the FDA had a role in the reformulation
22 of OxyContin?

23 A. The FDA, as we said, made it
24 a national priority to reformulate

1 OxyContin.

2 Q. Now, the Evans study
3 acknowledged that any shock associated
4 with oxycodone was not seen with the
5 prescription opioid market generally,
6 correct?

7 A. Where are you looking?

8 Q. Let me find it here. If you
9 look at the middle of Page 11 on
10 Exhibit 14, the last sentence says,
11 "These results for other drugs suggest
12 that there was not a change to the opioid
13 market more generally, but that the shock
14 was specific to oxycodone and heroin."

15 Do you see that?

16 A. I see that, yes.

17 MR. KO: I'm sorry. Where
18 are -- the witness was reading,
19 but where was that?

20 MR. GEISE: Page 11.

21 MR. KO: Okay. Thank you.

22 BY MR. GEISE:

23 Q. Now, the Evans study also
24 recognized that whatever impact the

1 substitution of heroin for opioids had
2 was dependent on a particular geographic
3 area, correct?

4 MR. KO: Object to the form.

5 THE WITNESS: Try that one
6 more time.

7 BY MR. GEISE:

8 Q. Sure. The Evans study
9 recognized that whatever impact the
10 substitution of heroin for opioids --
11 opioids had was dependent on the
12 particular area?

13 MR. KO: Object to the form.

14 THE WITNESS: He does -- the
15 core of the study is using
16 differences across areas in
17 understanding what happened after
18 2010.

19 BY MR. GEISE:

20 Q. Why don't we look at the
21 next section on Page 11 under Roman
22 Numeral IV, where Evans writes, "The
23 substitution of heroin for opioids is not
24 likely to be the same in all areas.

1 Areas where heroin is more easily
2 available or where there is pervasive
3 abuse of oxycodone will probably see
4 larger shifts from opioids to heroin."

5 Do you see that?

6 A. Yes.

7 Q. Now, the Evans study did not
8 look specifically at Cuyahoga and Summit
9 Counties, correct?

10 A. The Evans study used
11 national data, so it would include those
12 counties.

13 Q. But they didn't look
14 specifically at them to see where
15 Cuyahoga and Summit fall with respect to
16 the ease of availability of heroin or the
17 abuse of oxycodone, correct?

18 A. No. There's no reason they
19 would have. This is a national
20 representative academic study.

21 Q. After you read this national
22 academic study, did you convene any
23 research to see about the ease of
24 availability of heroin or the pervasive

1 abuse of oxycodone in Summit or Cuyahoga
2 Counties?

3 MR. KO: Object to the form.

4 THE WITNESS: We have data
5 on both heroin and we have data on
6 shipments of prescription opioids
7 of OxyContin in particular. And
8 we have data on deaths from heroin
9 from those counties that we use in
10 our analysis.

11 BY MR. GEISE:

12 Q. Well, did you perform any
13 research or analysis into the
14 pre-reformulation heroin death rates in
15 Cuyahoga and Summit counties?

16 A. We have data on the
17 preformulation death rates that's part of
18 the analysis.

19 Q. Did you perform any research
20 or analysis into the level of oxycodone
21 use in Cuyahoga and Summit counties
22 before the reformulation?

23 A. That's been part of our
24 analysis, yes.

1 Q. And respectfully, Professor
2 Gruber, when I read your report, I don't
3 see any summary of that analysis with
4 regard to pre-reformulation and heroin
5 deaths in Cuyahoga and Summit Counties.

6 A. Yes, that's not included in
7 the report. You're right. I just -- I
8 use a more summary -- if you look at
9 Figure 1.23, that's more summary of
10 mortality analysis than oxycodone
11 specific.

12 Q. The Evans study recognized
13 that abuse deterrent form, formations,
14 formulations can result in lower
15 mortality, correct?

16 A. You have to show me where
17 you're looking.

18 Q. Okay. If you go to Page 20,
19 Exhibit 14. The bottom paragraph. Evans
20 writes, "An important caveat is that we
21 are only able to examine short run
22 impacts of the reformulation. If the
23 stock of opioid abusers is significantly
24 reduced in the long run because of the

1 introduction of ADFs, then it is likely
2 that the stock of heroin users will also
3 be reduced in the long run. As a
4 consequence, even though there does not
5 appear to be a reduction in total opioid
6 and heroin deaths due to the
7 reformulation of OxyContin in the first
8 five years after reform, there could be a
9 reduction in these death rates in the
10 long run."

11 Do you see that?

12 A. Yes.

13 Q. Now, on Page 31 of your
14 report, I think it's at Paragraph 52, you
15 also quoted from Evans there to report
16 that "there appears to be a one-for-one
17 substitution of heroin deaths for opioid
18 deaths."

19 Do you recall that passage
20 in your report?

21 A. One moment. That's a direct
22 quote from the Evans report, yes.

23 Q. So in your report at
24 Paragraph 52 you write, "For example,

1 Evans et al. 2019 notes that 'when we
2 combined heroin and opioid deaths
3 together, we find no evidence that total
4 heroin and opioid deaths fell at all
5 after the reformulation' - there appears
6 to have been one-for-one substitution of
7 heroin deaths for opioid deaths."

8 Did I read that correctly?

9 A. You did.

10 Q. If you look at Page 21 of
11 Exhibit 14. Evans also stated in their
12 report, "Although we cannot reject
13 one-for-one substitution of heroin deaths
14 for opioid deaths in the aggregate,
15 combined heroin or opioid death rates did
16 fall after the reformulation in states
17 that had high levels of pre-reformulation
18 oxycodone use and relatively little
19 heroin availability."

20 Do you see that?

21 A. Yes.

22 Q. So do you agree that Evans
23 found a negative correlation between
24 OxyContin reformulation and

1 opioid-related death rates in certain
2 states?

3 MR. KO: Object to the form.
4 Also I believe it mischaracterizes
5 that statement. But you can
6 answer.

7 THE WITNESS: I guess I
8 wouldn't -- I wouldn't quite put
9 it that way. Let's be clear about
10 what he found, and maybe this is
11 what you mean, maybe it's not.

12 What he clearly found is
13 there was a subset of states in
14 which the reformulation led to a
15 total decline in mortality.

16 BY MR. GEISE:

17 Q. So if there is a total
18 decline in mortality, there could not be
19 a one-for-one substitution of heroin
20 deaths for opioid deaths, correct?

21 MR. KO: Object to the form.

22 THE WITNESS: In that subset
23 of states, in that quadrant, there
24 would not be.

1 BY MR. GEISE:

2 Q. And you agree that other
3 studies have refuted the idea that there
4 is a one-for-one substitution of heroin
5 deaths for opioid deaths, correct?

6 A. I don't recall other studies
7 showing that same estimate.

8 Q. Did you look for studies
9 that discussed that estimate?

10 A. That one-for-one estimate
11 was not central to my analysis, so I
12 didn't focus on other studies. I didn't
13 focus on a literature search around that
14 particular point.

15 Q. Well, even if it might not
16 be central to your analysis, you
17 certainly mentioned it in your report,
18 correct?

19 A. Yes.

20 Q. If I can have you look back
21 at Exhibit 5 to your deposition. This is
22 that Compton article from 2016, correct?

23 A. Mm-hmm. Yeah.

24 Q. And this is the article that

1 Evans actually cites in the report you --
2 his study that you rely on, correct?

3 A. He did cite this study, yes
4 among others.

5 Q. And again you're not sure --

6 A. Among others.

7 Q. Among others.

8 And you are not sure if you
9 read this one, correct?

10 A. That's correct.

11 Q. If I can ask you to turn to
12 Page 160 of Exhibit 5 and look at the
13 left-hand column on Page 160. Compton is
14 reporting on -- on studies that have
15 looked at -- at death rates following
16 2010.

17 And in the first full
18 paragraph on that left-hand column, he
19 writes, "The third study examined deaths
20 from overdose in Florida through 2012.
21 Florida had a well-documented
22 prescription opioid problem. Between
23 2010 and 2011 Florida instituted a series
24 of major policy changes that were

1 designed to reduce the inappropriate
2 supply of prescription opioids. After
3 these policies were implemented,
4 prescriptions were curtailed and the rate
5 of death from prescription opioid
6 overdose declined 27 percent between 2010
7 and 2012.

8 "Moreover, these significant
9 declines in prescription opioid mortality
10 were accompanied by an increase of only
11 60 deaths related to heroin, with the
12 overall number of total deaths from
13 overdose declining by 535 between 2010
14 and 2012."

15 Do you see that?

16 A. Yes.

17 Q. So that reports a study
18 there that after these changes in Florida
19 in 2010, that there was not a one-for-one
20 correlation of -- between opioid deaths
21 and heroin deaths?

22 A. Exactly what Evans says.

23 Q. And then if you look at the
24 next paragraph --

1 A. Let's be clear. I want to
2 clarify my answer. They don't find that,
3 which exactly what Evans said they should
4 fine that. Because Florida is a high
5 oxycodone/low heroin state, and as Evans
6 says, there isn't a one-for-one
7 substitution of the OxyContin --
8 oxycodone/low heroin states. So it's
9 not -- these are consistent with each
10 other.

11 Q. Right. But it's also an
12 example of a state that did not see a
13 one-for-one replacement, correct?

14 A. That's correct, yeah.

15 MR. KO: Objection. Asked
16 and answered.

17 BY MR. GEISE:

18 Q. If you look at the next
19 paragraph it cites to a New York study.
20 It says, "The fourth study which examined
21 opioid overdoses in New York showed a
22 29 percent reduction in the rate of death
23 from prescription opioid overdose coupled
24 with declines in the rates of overall and

1 high dose opioid prescribing in Staten
2 Island, New York, in 2013 after the
3 implementation of targeted and general
4 public health initiatives, including a
5 heavy focus on prescribing behaviors.
6 Importantly, these decreases were not
7 offset by increases in mortality from
8 heroin-involved overdose during the same
9 time period."

10 Do you see that?

11 A. Yes.

12 Q. So this is again another
13 example of there not being a one-for-one
14 replacement of a heroin death for an
15 opioid death, correct?

16 A. That's correct. I have not
17 reviewed the studies they are citing. As
18 I said I've reviewed the Evans study.
19 It's a very high quality empirical study.
20 I don't -- so I can't speak to the
21 quality of these studies relative to the
22 Evans study.

23 But what you've read to me
24 is certainly consistent with what we

1 discussed about certain states seeing a
2 fall in total mortality.

3 Q. Professor Gruber, I'm going
4 to jump out of order for a second. I
5 can't find a couple extra copies of the
6 next exhibit I want to use.

7 MS. SUTTON: Do you need
8 copies made?

9 MR. GEISE: We may, but the
10 copy I have is marked up, so I'm
11 just trying to find a clean one.
12 But that's all right. We can keep
13 progressing.

14 BY MR. GEISE:

15 Q. Back to our regularly
16 scheduled programming.

17 (Document marked for
18 identification as Exhibit
19 Gruber-15.)

20 BY MR. GEISE:

21 Q. Professor Gruber, I'm
22 handing you what's marked as Exhibit 15
23 to your deposition.

24 And do you recognize this as

1 the 2018 publication from Alpert, Powell,
2 and Pacula entitled "Supply-Side Drug
3 Policy in the Presence of Substitutes:
4 Evidence from the Introduction of Abuse
5 Deterrent Opioids"?

6 A. Yes, I do.

7 Q. And this is -- you refer to
8 this in your report as one of those three
9 economic studies, correct?

10 A. Yes, I do.

11 MR. KO: Do you have any
12 extra copies of those?

13 MS. CASTLES: Trying.

14 MR. GEISE: Do you want to
15 wait and make copies? We can.

16 MR. KO: Why don't we -- why
17 don't we keep going, and then to
18 the extent that I need a copy
19 right away, I'll let you know.
20 But go ahead. You can share your
21 version as well.

22 MR. GEISE: He's got --

23 MR. KO: The one that's
24 marked up?

1 MR. GEISE: No.

2 MR. KO: That's what I
3 meant.

4 MR. GEISE: No, no. He's
5 got a clean one.

6 BY MR. GEISE:

7 Q. Professor Gruber, if you
8 look on Page 1 the first sentence they
9 write, "Overdose deaths between" -- "from
10 prescription opioid pain relievers nearly
11 quadrupled between 1999 and 2010. We
12 studied the consequences of one of the
13 largest supply disruptions to date to
14 abusable opioids, the introduction of an
15 abuse-deterrent version of OxyContin in
16 2010."

17 Do you see that?

18 A. Yes.

19 Q. So like the Evans study,
20 these authors also focused on the
21 reformulation of OxyContin, correct?

22 A. Correct.

23 Q. And they did not study the
24 impact of opioid shipments generally,

1 correct?

2 A. In this study, they -- I
3 don't believe they used opioid shipments
4 data.

5 Q. If you look at the last
6 sentence of that abstract paragraph on
7 Page 1. The authors write, "Our results
8 imply that the recent heroin epidemic is
9 largely due to the reformulation of
10 OxyContin," correct?

11 A. That's what it says, yes.

12 Q. Now, if we look at the
13 conclusions section which is on Page 31
14 of Exhibit 15, do you agree that in the
15 entire conclusions section, shipments of
16 prescription opioids are not mentioned?

17 A. I have to take a minute to
18 read it.

19 They don't mention the word
20 "shipments." They use -- once again, as
21 we discussed repeatedly, shipments is one
22 of the proxies people have used for the
23 supply of prescription opioids and the
24 consumption of prescription opioids.

1 They use other terms here. They use
2 other terms in their description.

3 Q. What other terms do you
4 think they use in their description that
5 is equivalent to the term that you've
6 used for shipment of prescription
7 opioids?

8 A. "Prevalence of OxyContin
9 misuse" is one term they use. And then
10 later they use the term -- they later
11 talk about the supply of opioids, but
12 that's more indirect. I think really the
13 main one they use is the first one.

14 Q. Okay. So you agree that the
15 main focus of this paper was to look at
16 the prevalence -- the impact of the
17 reformulation of OxyContin, correct?

18 A. Yes.

19 Q. An in the conclusion
20 section, when they talk about that, they
21 talk about the prevalence of OxyContin
22 misuse, correct?

23 A. Correct.

24 Q. This is not a study that

1 looked at the impact of opioid shipments
2 as a whole?

3 MR. KO: Object to the form.

4 THE WITNESS: This study is
5 similar in spirit to the Evans
6 study. Both are asking the
7 question -- both are saying, look,
8 there's a sharp change in 2010
9 with the reformulation. We want
10 to look at how that affected
11 different places differently.

12 Evans divide the area up --
13 divides his areas up based on
14 shipment data. They divide their
15 areas up based on misuse data as
16 measured in the NSDUH. Both --
17 they're just using two different
18 proxies to try to get at the same
19 question.

20 BY MR. GEISE:

21 Q. But their proxy to get at
22 the question here is the use and misuse
23 of OxyContin, correct?

24 A. As reported in the NSDUH.

1 Q. Right. Their use of a proxy
2 here is not earlier shipments of
3 prescription opioids, is it?

4 A. I don't -- one second. What
5 they say on Page 12, if you look at Page
6 12 at the top. They say, "Using ARCOS we
7 also show there's a strong correlation
8 with OxyContin misuse in the per capita
9 legal supply of oxycodone." So they rely
10 on the NSDUH data as their primary
11 measure, but they sort of look to
12 shipments as a validation for what
13 they're doing.

14 Q. But not shipments of
15 prescription opioids, just shipments of
16 OxyContin and oxycodone, correct?

17 A. Those are the two that they
18 focus on, yes.

19 Q. If you look back at your
20 report in Paragraph 97 where you're
21 discussing this Alpert article which is
22 Exhibit 15 to your deposition. We -- see
23 that Paragraph 97?

24 A. Yes.

1 Q. At the end of the paragraph
2 before the block quote that cites to the
3 Alpert article, you wrote, "Alpert, et
4 al., conclude that the increase in heroin
5 mortality after 2010 is directly related
6 to earlier shipments of prescription
7 opioids and the 2010 reformulation of
8 OxyContin."

9 Do you see that?

10 A. Yeah.

11 Q. And then you have a block
12 quote that you pull from the Alpert
13 article, correct?

14 A. Correct.

15 Q. Would you agree with me
16 though, that Alpert does not conclude
17 that the increase in heroin mortality
18 after 2010 is directly related to earlier
19 shipments of prescription opioids?

20 MR. KO: Object to the form.

21 THE WITNESS: They don't use
22 that measure. But their theory
23 underlying it is the same as the
24 theory underlying the Evans as

1 well as the theory that I refer to
2 in this article, which is that
3 it's about the use of prescription
4 opioids. They used a different
5 measure, but it's the same idea.

6 BY MR. GEISE:

7 Q. It may be the same idea.
8 But as you've used shipments of
9 prescription opioids throughout your
10 report, it means -- it means general
11 aggregate shipments of prescription
12 opioids, correct?

13 MR. KO: Object to the form.

14 THE WITNESS: That's
15 correct.

16 BY MR. GEISE:

17 Q. Okay. When you use that
18 term in Paragraph 97, shipments of
19 prescription opioids does not mean that
20 in relation to the Alpert article,
21 correct?

22 A. That's a good point.

23 Q. If I can turn your attention
24 to Page 15 of Exhibit 15. I think this

1 is consistent with something we discussed
2 earlier. But there's a section on
3 results.

4 Do you see that?

5 A. Yes.

6 Q. If you go down to the end of
7 the second paragraph under the Roman
8 numeral, do you see the sentence that
9 reads, "In states with the highest
10 initial OxyContin misuse, the rate of
11 OxyContin misuse declined by nearly
12 50 percent after the reformulation, while
13 OxyContin misuse actually increased
14 slightly in states with the lowest rates
15 of initial OxyContin misuse."

16 Do you see that?

17 A. Yes.

18 Q. Do you know where the state
19 of Ohio falls among states as either the
20 highest or lowest initial OxyContin
21 misuse?

22 A. No, I don't.

23 Q. Do you know where the
24 counties of Cuyahoga and Summit fall

1 within rates of highest or lowest initial
2 OxyContin misuse?

3 A. No, I don't.

4 Q. In looking at the focus of
5 Alpert's study into OxyContin in
6 particular, would you agree that his
7 study makes no comment on the
8 responsibility of distributors for
9 opioid-related deaths?

10 MR. KO: Object to the form.

11 THE WITNESS: Just
12 correction. It's her study.

13 BY MR. GEISE:

14 Q. Sorry.

15 A. The co-authors. And they
16 discuss the general phenomenon how the
17 introduction of abuse-deterrent opioids
18 led to more mortality. They don't
19 discuss specifically the roles of
20 individual parties in that.

21 (Document marked for
22 identification as Exhibit
23 Gruber-16.)

24 BY MR. GEISE:

1 Q. Professor Gruber, let me
2 hand you what's been marked as Exhibit 16
3 to your deposition. You recognize this
4 as -- it's entitled "A Transitioning
5 Epidemic: How the Opioid Crisis is
6 Driving the Rise in Hepatitis C."

7 Do you see that?

8 A. Yes, I do.

9 Q. And it's written by David
10 Powell, Abby Alpert, and Rosalie Pacula?

11 A. Yes.

12 Q. And this is the third
13 economic -- piece of economic literature
14 that you cite in this section of your
15 report that begins on Page 68, correct?

16 A. Correct.

17 Q. Upfront, do you agree that
18 this study did not examine any
19 correlation between prescription opioid
20 shipments and hepatitis C infections?

21 A. Once again, this is in the
22 spirit of the Evans study and my report
23 in trying to establish a relationship
24 between places that had a lot of use of

1 prescription opioids and a rise in
2 illicit opioids after 2010.

3 As in the previous study by
4 the same authors, they just flipped the
5 order of the first two authors, but the
6 same authors, their measure is the NSDUH
7 measure of OxyContin misuse.

8 Q. So if we look at the heading
9 on Page 68 of your report where you
10 write, "The economic literature
11 recognizes that the increase in heroin
12 mortality after 2010 is attributable to
13 shipments of prescription opioids."

14 Do you see that header?

15 A. Yes.

16 Q. All three of these articles,
17 Evans, Alpert, and this one by Powell,
18 they relate to OxyContin use and misuse
19 specifically, correct?

20 A. Yes, they do.

21 Q. So throughout your report
22 where you talk about shipments of
23 prescription opioids in the aggregate, it
24 would be misleading in this heading to

1 say that this economic literature
2 recognizes the increase in heroin
3 mortality after 2010 is attributable to
4 shipments of prescription opioids in the
5 aggregate, correct?

6 MR. KO: Object -- object to
7 the form. Also mischaracterizes
8 the report.

9 THE WITNESS: It wouldn't be
10 misleading in the sense that this
11 is -- OxyContin shipments are a,
12 if not the major contributor to
13 aggregate shipments.

14 BY MR. GEISE:

15 Q. But, I think you told us
16 before today that you did not form any
17 opinion particular to any particular
18 defendant in this case, correct?

19 A. That's correct.

20 Q. And where you speak in your
21 report about shipments to prescription
22 opioids, you've defined it before, that
23 that includes all shipments, correct?

24 A. That is correct.

1 Q. And you --

2 A. All shipments that are
3 included in the ARCOS data.

4 Q. And you would agree with me
5 that these three pieces of literature
6 from the economic literature do not look
7 at shipments of prescription opioids in
8 the aggregate, they look specifically at
9 OxyContin?

10 A. Yes.

11 Q. If I can just turn your
12 attention to Page 293 of Exhibit 16. On
13 the left-hand column, the first full
14 paragraph, the authors write, "Our
15 findings do not rule out the possibility
16 that other factors, such as changes in
17 the availability of prescription opioids
18 or increased availability of inexpensive
19 heroin from Mexico may have also
20 independently contributed to the national
21 rise in the hepatitis C infection rates."

22 Do you see that?

23 A. Yes.

24 Q. And again, in looking at the

1 economic literature that is available,
2 have you conducted an analysis of
3 literature that examines the impact of
4 availability of inexpensive heroin from
5 Mexico on hepatitis C infection rates?

6 A. If you read the rest of this
7 paragraph I think you are sort of talking
8 a lot about the kind of literature
9 economists use in articles where we try
10 to be cautious. But if you read the rest
11 of this paragraph, they are saying we
12 can't rule it out, but we've done a
13 number of tests to show that it does not
14 seem to be driving our results.

15 I just want to clarify that.
16 They -- they are not claiming this is a
17 major causal role. They are just being
18 cautious in -- in highlighting that they
19 can't rule it out.

20 But to answer your question
21 directly, I've not directly studied
22 hepatitis C infection rates.

23 Q. And they also said those
24 other factors would not be correlated

1 specifically with the state's initial
2 rate of OxyContin misuse, correct?

3 A. Correct.

4 Q. In -- in your earlier answer
5 you said that economists in articles try
6 to be cautious.

7 A. Not always, but typically,
8 that's what we're trained to do.

9 Q. Did you approach writing
10 your report as you would approach writing
11 an article as an economist?

12 A. In some ways, yes. In some
13 ways, no.

14 Q. In what ways didn't you?

15 A. It is more -- the style of
16 writing is not the style I'd use for an
17 economic article.

18 It -- the -- the arguments
19 and the way I place the arguments would
20 be more equipped to an article that's
21 like a review of a literature, rather
22 than an article that is trying to
23 establish a new scientific finding.

24 Q. With respect to being

1 cautious and looking in particular at the
2 heading on Page 68 of your report, do you
3 think that's an example of being cautious
4 about writing in -- in literature or not?

5 A. I believe that's an example
6 of trying to make a point using the
7 language that the fact that it's triple
8 the shipments of prescription opioids, of
9 which OxyContin is a major opioid.

10 MR. GEISE: Professor
11 Gruber, I think we're going to
12 take a break now. I think you may
13 be done answering questions from
14 me --

15 THE WITNESS: Okay.

16 MR. GEISE: -- which is
17 probably good for you. But I
18 thank you for your -- your time
19 and your patience with me today.

20 THE WITNESS: Thanks.

21 THE VIDEOGRAPHER: The time
22 is 5:12 p.m. We are off the
23 record.

24 (Short break.)

1 THE VIDEOGRAPHER: The time
2 is 5:22 p.m. We are on the
3 record.

4 - - -
5 EXAMINATION

6 - - -

7 BY MR. HALLER:

8 Q. Well, Professor Gruber, my
9 name is, excuse me, David Haller. I'm
10 with the law firm of Covington and
11 Burling.

12 And my questioning might be
13 a little more disjointed than Mr. Geise's
14 in part because, probably naturally so,
15 but also because I'm trying to fill in
16 little gaps here or there.

17 MR. KO: Give yourself some
18 more credit.

19 MR. HALLER: Okay. Well,
20 we'll see. I like to set low
21 expectations.

22 BY MR. HALLER:

23 Q. Now, with regard to your
24 100-county analysis, you included four

1 counties from that that you believe to be
2 outliers; is that right?

3 A. I believe so.

4 Do you remember where --
5 where that footnote is? Footnote 97,
6 right?

7 Q. Correct. Reflected on
8 Page 58.

9 MR. KO: And did you say 100
10 counties?

11 MR. HALLER: Yeah.

12 THE WITNESS: I believe
13 that -- what happened? My
14 goodness, my pages got out of
15 order.

16 But the -- the -- the four
17 excluded from the entire
18 404-county sample.

19 BY MR. HALLER:

20 Q. Okay. And were those the
21 four counties that -- that had the
22 highest level of per capita shipments?

23 A. Per -- they were the highest
24 level of per capita MME.

1 As we describe in the
2 report, we take the shipments by type of
3 drug and then multiply by a factor which
4 shows the potency of the drug as measured
5 by morphine equivalence. And so our key
6 valuable is not the number of shipments,
7 but the MME, the morphine equivalence of
8 shipments, and those had the highest --
9 the four really outlying values of MME
10 per capita per day.

11 Q. But those MME per capita
12 were MME per capita that were shipped; is
13 that right?

14 A. Those are shipments of MME
15 per capita per day to those four
16 counties.

17 Q. Okay. And did those four
18 counties also have the highest level of
19 opioid mortality within the 404-county
20 sample?

21 A. I don't know.

22 Q. Would I be able to find in
23 your data anywhere the mortality for
24 those four counties, and how they compare

1 to the mortality of the not excluded
2 counties?

3 A. It's not in the report. I
4 mean it's -- I don't know what data is
5 being produced to you.

6 But I think the key point is
7 that as I described before, when there's
8 outliers in the data it's standard
9 practice in economics to worry about
10 whether they are going to have an undue
11 influence on the results. And typically
12 to test -- sort of pressure test the
13 results, both with and without those
14 observations, which is what we do here,
15 we were concerned enough that they
16 didn't reflect -- they were concerned
17 enough that they would have an undue
18 influence that excluded them, but we've
19 also ran the results with them included
20 and it doesn't change the results
21 materially.

22 Q. And in which directions did
23 they change the results if they had been
24 included, even if not materially?

1 A. I don't remember.

2 Q. Do you know what four
3 counties those were?

4 A. I've seen the list, but I
5 can't recall it offhand.

6 Q. Do you know what state they
7 were in?

8 A. I don't recall.

9 Q. Do you know either from your
10 own work or from any study, the
11 percentage of people who received a
12 prescription for a medically necessary
13 condition for prescription opioid and
14 later became addicted to heroin?

15 MR. KO: Object to the form.

16 THE WITNESS: That was a
17 long question. Can you either say
18 it again or break it down?

19 BY MR. HALLER:

20 Q. Do you know either from your
21 own work or from any study the percentage
22 of people who had a prescription opioid
23 for a legitimate medical need and later
24 became addicted to heroin?

1 MR. KO: Object to the form.

2 THE WITNESS: I don't know
3 that number offhand, although
4 studies we've looked at during
5 today have made reference to
6 computations like that, of that
7 nature, which suggest that a very
8 small minority of people who get
9 prescriptions then transition onto
10 heroin.

11 BY MR. HALLER:

12 Q. But you don't know what that
13 percentage is? Do you believe it to be a
14 single-digit percentage?

15 A. I don't recall the way that
16 you phrased it. One of the studies -- we
17 can look back at it, in a particular way
18 they phrased it, they had a number of 1
19 percent. But I don't recall what that
20 was 1 percent of.

21 Q. To talk a little bit about
22 your Gateway hypothesis, do you know the
23 demographic that's most likely to be
24 prescribed a prescription opioid?

1 A. No. I knew once, and now I
2 don't recall. I'm sorry.

3 Q. Would that refresh your
4 memory if those were older women?

5 A. I recalled that it was older
6 people. I didn't recall men or women.
7 But that would not surprise me.

8 Q. Okay. And do you know that
9 the demographic most likely to be
10 addicted to heroin are younger men?

11 A. Once again, I don't know. I
12 mean, I knew, but I don't recall.

13 Q. And that doesn't refresh
14 your memory?

15 A. That one, I don't recall as
16 well.

17 Q. If you assume for the moment
18 that the demographic most likely to be
19 prescribed a prescription opioid is older
20 women, and the demographic most likely to
21 become addicted to heroin are younger
22 men, how do you square those facts with
23 your gateway hypothesis? I take it that
24 you don't assume that older women pass

1 through the gateway and become younger
2 men, right?

3 MR. KO: Object to the form.

4 Which question -- there's two
5 questions? Which one do you want
6 him to answer?

7 BY MR. HALLER:

8 Q. You can answer.

9 A. I'll ignore the second
10 question you asked.

11 Q. Right.

12 A. And focus on the first.

13 When you take a set of data,
14 which are showing a relationship, that
15 does not mean that every element of the
16 data perfectly conforms with that
17 relationship. You've pointed out two
18 pieces of data which don't conform with
19 the notion of prescription opioids, a
20 gateway to heroin. That does not mean in
21 any way, shape, or form prescription
22 opioids aren't a gateway to heroin. It's
23 just about an observation of two elements
24 of the data.

1 Q. At least for the older women
2 demographic, would you agree that
3 those -- that demographic is not passing
4 through the gateway?

5 MR. KO: Object to the form.

6 THE WITNESS: I do not -- I
7 do not know.

8 BY MR. HALLER:

9 Q. Do you have any opinion as
10 to whether all of the people who are
11 addicted to -- were addicted to heroin in
12 2018 were addicted to prescription
13 opioids in 2010 or earlier?

14 A. My opinion would be that --
15 I haven't studied this, but you asked my
16 opinion. I would say that not that -- it
17 is not true that every single person
18 addicted to heroin in 2018 was issued a
19 prescription of opioids before 2010.

20 Q. And so you agree that a
21 significant number of the people who were
22 addicted to heroin in 2018 became
23 addicted to heroin at some point after
24 2010?

1 MR. KO: Object to the form.

2 THE WITNESS: I don't know
3 what a significant number is. But
4 certainly some did.

5 BY MR. HALLER:

6 Q. Now, you're familiar with
7 the fact that Professor Cutler determined
8 that there was a break in his model in
9 December 2010, such that he did a direct
10 regression between shipments and opioid
11 mortality only up through December 2010;
12 is that right?

13 A. That's my recollection, yes.

14 Q. And he did not do any
15 regression -- any direct regression
16 between shipments and opioid mortality
17 for the period after December 2010; is
18 that right?

19 A. That's correct.

20 Q. Now, in the analyses that
21 you did purporting to show a relationship
22 between shipments and opioid mortality,
23 you used 2010 shipment data; is that
24 right?

1 MR. KO: Object to the form.

2 THE WITNESS: I used
3 shipment -- I used -- I have
4 different analyses in the report.
5 So I think you'll have to talk
6 about which particular figure
7 you're referring to or analysis.

8 BY MR. HALLER:

9 Q. Let's -- I want to refer you
10 to Page 59 of your report.

11 A. Okay.

12 Q. With regard to and figure
13 1.18, what shipment data are you using?

14 A. There we are splitting into
15 counties by whether they have a high or
16 low level of shipments of prescription
17 opioids over the 1999 to 2010 period on
18 average.

19 Q. Is there a name for the
20 analysis that you're doing here that's
21 reflected in this figure where you
22 have -- you're comparing the highest
23 quartile shipments with the lowest
24 quartile shipments? What do you call

1 that analysis?

2 A. I would call it a way to use
3 the data to sort of transparently
4 illustrate the causal relationship
5 between shipments and mortality.

6 Q. Let me -- for the work that
7 Professor Cutler did, I know that's
8 called a multivariate regression
9 analysis. And I can go into lots and
10 lots of textbooks, and they can talk to
11 me about that, right.

12 But if I want to look for a
13 textbook that discusses -- that discusses
14 the analysis that you're doing on this
15 page, this type of analysis, what do I
16 look for in the index? What's this
17 called?

18 MR. KO: Object to the form.

19 THE WITNESS: I would not
20 say this has a particular
21 methodological name. You would
22 see, if you looked at many, I
23 might say most, modern empirical
24 economic analyses, they will

1 typically include, in addition to
2 multivariate regression analysis,
3 increasingly they're including
4 graphical illustrations of the
5 data so that the reader can -- the
6 reader who is not -- the reader
7 can transparently understand
8 what's going on in the data,
9 rather than to rely on the
10 statistical interpretation.

11 So we typically, you know,
12 so we encourage our students today
13 when they're writing a paper to
14 include both figures that
15 transparently illustrate the story
16 they are trying to tell, as well
17 as using underlying statistical
18 analysis to make that more
19 concrete.

20 BY MR. HALLER:

21 Q. And I'm not focused so much
22 on the graphic itself as the analysis
23 that underlines -- underlies the graphic,
24 where you've divided -- you take the

1 lowest quartile and the highest quartile,
2 and you've shown a difference in terms of
3 mortality, growth between those two
4 quartiles. What's the name of that
5 analysis so I can find it in a textbook?

6 MR. KO: Objection. Asked
7 and answered.

8 THE WITNESS: I don't know
9 that there's a common name for
10 this analysis that you find in a
11 textbook. I think the right way
12 to think about this is if you look
13 at a, once again, increasingly
14 with modern empirical analysis,
15 this would be a typical way to
16 make an argument and to -- and to
17 illustrate how you've convincingly
18 tested your hypothesis, would be
19 to combine the kind of graphical
20 analysis I have here with the kind
21 of multivariate regression
22 analysis that Professor Cutler
23 does in his report.

24 BY MR. HALLER:

1 Q. But what you're showing
2 graphically here is not Professor
3 Cutler's regression, it's something else,
4 right?

5 MR. KO: Objection. Asked
6 and answered.

7 THE WITNESS: This is --
8 this is using the same data
9 Professor Cutler does, the exact
10 same dataset, to show clearly for
11 the reader who wants to go beyond
12 the statistical analysis to
13 actually visualize the data and
14 say, is there a clear indication
15 in the data of what's happening.

16 This is -- I would say this
17 is a compliment using the same
18 data that Professor Cutler does,
19 it's identical dataset.

20 BY MR. HALLER:

21 Q. If we were -- if we were
22 graphing Professor Cutler's work, we'd
23 have some sort of a line running through
24 400 different dots, right, showing them

1 on -- what those regression points were
2 for him, correct?

3 A. That would be one way to
4 illustrate his specific results.

5 Q. Whether in a textbook or
6 some other source, can you point me to
7 any source that would describe for me the
8 type of, you know, high quartile --
9 highest quartile-lowest quartile analysis
10 that you're doing here and would state
11 that that's an appropriate means to show
12 causation?

13 MR. KO: Object to the form.

14 THE WITNESS: Sure. The
15 Evans study that we -- Evans,
16 Lieber and Powell study does
17 exactly this kind of analysis,
18 where they divide the country into
19 high -- they divide the country
20 into -- they -- they don't use
21 quartiles, per se, but divide the
22 country to essentially high --
23 high heroin, high oxy, low --
24 they -- they divide the -- they

1 divide the country by -- by two
2 dimensions: Heroin use and -- and
3 oxy use pre 2010, and then they
4 analyze separately the effect in
5 those four groups.

6 That's just sort of a
7 two-dimensional version of what
8 I'm doing here.

9 BY MR. HALLER:

10 Q. And in addition to the Evans
11 study, can you point me to any other
12 study which uses this type of analysis to
13 prove causation?

14 A. Not offhand, no.

15 Q. And the Evans study doesn't
16 purport to show causation, does it?

17 A. Yes, it does.

18 Q. Does it?

19 A. Yeah.

20 Q. Now, if I can refer you back
21 to Page 56 of your report where you --
22 it's another quart -- high -- highest
23 quartile-lowest quartile analysis. But
24 it relates to opioid use disorder rates,

1 correct?

2 A. Yes. That's right.

3 Q. Okay. And did we establish
4 earlier that Summit and Cuyahoga are
5 neither in the top 25 percent quartile,
6 nor in the bottom 25 percent quartile?

7 A. Yes. That's correct.

8 MR. KO: And to be clear,
9 this is a graph depicting states.
10 I think the question was asked
11 about counties.

12 THE WITNESS: Okay. Oh yes,
13 you're right. Once again, I --
14 thank you, David. I clarified
15 that earlier.

16 BY MR. HALLER:

17 Q. Yes.

18 A. There's a lot of different
19 graphs here.

20 This is a state graph, I
21 don't recall whether Ohio is in the top
22 or bottom 25 percent.

23 Q. Now, I assume, tell me if
24 I'm right, that there are exceptions

1 with -- within the states. In other
2 words, are there any states that are in
3 the bottom 25 percent of shipments but
4 are not -- or above the bottom 25 percent
5 in terms of opioid use disorder rates?

6 MR. KO: Object to the form.

7 THE WITNESS: Whenever we do
8 analysis type in economics, be it
9 through regression analysis or
10 through this kind of graphical
11 representation of the data, we're
12 looking for central tendencies in
13 the data.

14 We don't claim that every
15 single observation lines up with
16 what's shown in those central
17 tendencies, but that's not the
18 purpose. The purpose is to draw
19 ultimately causal conclusion, and
20 the causal conclusion will be
21 based on the central tendency in
22 the data, not the behavior of any
23 single observation.

24 BY MR. HALLER:

1 Q. Well, I understand your
2 goal. But my question is, in fact, in
3 connection with this particular analysis,
4 were there any states that were within
5 the bottom 25 percent of shipments but
6 were above the bottom 25 percent in terms
7 of OUD rates?

8 MR. KO: Object to the form.

9 THE WITNESS: I didn't look
10 at that.

11 BY MR. HALLER:

12 Q. Do you assume -- do you
13 assume that it's likely there's at least
14 one such state?

15 MR. KO: Object to the form.

16 THE WITNESS: Since this is
17 the average, unless all the states
18 are identical, by definition there
19 must be at least one state that is
20 above the average and at least one
21 state that's below the average,
22 otherwise this would not be the
23 average.

24 BY MR. HALLER:

1 Q. And likewise with regard to
2 the top 25 percent of shipments. Was
3 there any state that was in the top
4 25 percent of shipments but was below the
5 top 25 percent in terms of opioid use
6 disorder rates?

7 A. Once again, I didn't study
8 that.

9 Q. But once again, you assumed
10 there's at least one such state, maybe
11 more, correct?

12 A. I assume that's true, yes.

13 Q. Now, the difference
14 between -- the difference in the OUD
15 rates between the bottom quartile and the
16 top quartile is in the range of about
17 40 percent, right? The top quartile OUD
18 rate is about 40 percent greater than the
19 bottom quartile rate, correct?

20 MR. KO: Object to the form.

21 THE WITNESS: Once again,
22 it's hard to tell with
23 percentages. It depends. As a
24 percent of the bottom it more

1 looks like more it's 50 percent
2 higher. You could say the top
3 25 percent is 50 percent higher
4 than the bottom, or you could say
5 the bottom is 60 percent as high
6 as the top.

7 BY MR. HALLER:

8 Q. Okay. Well, I won't
9 quibble. It looked like 40 percent to
10 me, but I'll take 50 percent. But the --
11 the top is about 50 percent higher,
12 right?

13 A. Right.

14 MR. KO: Object to the form.
15 Also mischaracterizes the
16 witness's response to your
17 previous question.

18 BY MR. HALLER:

19 Q. Well, if we can compare that
20 difference to the difference on Page 59
21 in your Figure 1.18 which compares the
22 bottom quartile in shipments with the top
23 quartile in shipments.

24 The difference in mortality

1 between those two quartiles is much
2 greater than 40 or 50 percent, correct?

3 A. It depends on the year in
4 which you look.

5 Q. It points in the middle of
6 the graph, right, in the meat of the
7 graph, the differences range between
8 200 percent, 300 percent, 400 percent, in
9 that range, right?

10 MR. KO: Object to the form.

11 THE WITNESS: That's
12 correct.

13 BY MR. HALLER:

14 Q. Do you have an opinion as to
15 why, given the same differences in
16 shipments, the difference in mortality is
17 so much greater than the difference in
18 opioid use disorder?

19 A. I have some hypotheses.

20 Q. What -- what are those?

21 A. One that I focus on in the
22 paper is that the NSDUH data used in
23 Figure 1.17 to look at OUD rates is --
24 has a number sources of mismeasurement

1 which I cite from the literature. In
2 particular, it doesn't include
3 populations that are particularly likely
4 to use opioids such as incarcerated
5 populations, or homeless populations.

6 There's also the fact we
7 cite in the report that people have
8 been -- a number of studies have shown
9 that people underreport their use of
10 these drugs. So for that reason it's
11 underreported. So there's a number of
12 reasons why the NSDUH OUD rates would be
13 underreported, whereas the mortality rate
14 is more appropriate administrative data.
15 So that could be one reason that they're
16 different.

17 You know, that would be my
18 first pass.

19 Q. Is another reason, another
20 hypothesis that, given what you referred
21 to earlier as the increased lethality,
22 the radical lethality of fentanyl, that
23 that drives mortality higher than it
24 drives opioid use disorder?

1 A. That could be true, but it's
2 not actually supported by the data in the
3 sense that if you look at -- you were
4 looking at the difference between the two
5 bars in Figure 1.17 versus the two lines
6 in Figure 1.18.

7 Q. Right.

8 A. You see that difference
9 actually peaks before fentanyl was really
10 a factor. So I don't know that we can
11 say that fentanyl explains -- the
12 lethality of fentanyl explains that.
13 It's possible, but the graph doesn't look
14 consistent with that.

15 Q. I believe in the 2012, 2014
16 and 2016 time periods, there's still a
17 300 percent difference between the lines,
18 right?

19 A. That's correct.

20 Q. In any of your analyses,
21 what -- did you ever include a fentanyl
22 factor to, you know, test whether that's
23 affecting your conclusions at all?

24 A. I don't know what that

1 means.

2 Q. Is there any analysis in
3 your report, any regression, any of these
4 quartile analyses, that takes into
5 account the lethality of fentanyl?

6 A. Well, I -- that's
7 incorporated in my discussion. And we
8 show repeatedly the data including
9 fentanyl. So if you look at Figure 1.19,
10 we show mortality including heroin or
11 fentanyl. If you look at Figure 1.9, we
12 show the fentanyl mortality rate east and
13 west of the Mississippi River. If you
14 look at Figure 1.8, we know the opioid
15 mortality rate by type of opioid in large
16 counties. So in a variety of places --
17 oh, and then finally in Figure 1.6, we
18 show the relative strength of 1 milligram
19 prescription opioids.

20 So a number of places we
21 discuss the role of fentanyl in various
22 ways in the analysis.

23 Q. In your regression where
24 you're looking at the variation in

1 shipments -- strike that. Sorry.

2 It's your opinion that at
3 some point in 2010 or thereabouts, the
4 price of heroin became relatively lower
5 than the price of prescription opioids;
6 is that right?

7 A. It's my opinion that around
8 2010, the price of heroin, relative to
9 the price of opioids, fell. I don't
10 know -- you made a comparison about the
11 level, that one was lower than the other.
12 I know the ratio fell. I don't know what
13 it did to -- what it did to the level,
14 whether one got cheaper than the other
15 per unit. I'm not sure about that. But
16 I know that it got relatively cheap
17 compared to opioids after 2010.

18 Q. What data do you have
19 concerning the street prices of heroin,
20 either nationally or in the relevant
21 counties?

22 A. I don't use that data in
23 this report.

24 Q. Do you know where you can

1 find that?

2 A. In my discussion, in my
3 answer to you I'm referring to really
4 sort of observational, you know,
5 discussions of the opioid crisis that
6 I've read, which have described that.
7 But I have not analyzed the data.

8 Q. And what about the
9 availability of fentanyl? Have you -- do
10 you have any data that shows the
11 availability of fentanyl over time of
12 nationally and the affected counties?

13 A. Yes. If you look at Figure
14 1.7. So this is data from the DEA's
15 national forensic laboratory information
16 system which reports the identification
17 results of drug samples confiscated by
18 law enforcement that were submitted to
19 and analyzed by participating federal,
20 state, and local forensic laboratories.

21 And what it shows is that
22 the share of drug confiscations by law
23 enforcement that involve fentanyl
24 increased from .1 percent in 2013 to 5.2

1 percent in 2017.

2 Q. Do you have any data
3 concerning the price of fentanyl during
4 any period of time?

5 A. No, I don't.

6 Q. Do you have any data
7 concerning the street price of
8 prescription opioids?

9 A. No, I don't.

10 Q. So can you point me
11 specifically to any source -- you
12 referred that you've read, you know, some
13 literature. But can you point me to any
14 source where it's specifically stated,
15 you know, what the street prices of
16 prescription opioids were compared to the
17 street prices of heroin, compared to the
18 street prices of fentanyl over time?

19 MR. KO: Object to the form.

20 THE WITNESS: I -- I cannot
21 point you to a particular source,
22 no.

23 BY MR. HALLER:

24 Q. Now, you understand, and I

1 think reflected in your report, right,
2 that Ohio appears to have, amongst all of
3 the 50 states, the highest -- the very
4 highest level of fentanyl; is that right?

5 A. So if we look at -- the bar
6 chart with all the counties --

7 Q. Page 46?

8 A. Page 46. Thank you.

9 Q. On Page 45.

10 A. 48. I'm sorry. 48. Page
11 48, I have a figure which talks about
12 opioid mortality rates in the 100 large
13 counties with the highest rates. And I
14 break out Ohio and adjacent states. I
15 don't do Ohio, per se. And this is not
16 fentanyl, per se.

17 This is -- so it speaks
18 somewhat to what you're discussing, but
19 it's not fentanyl, per se, and it's not
20 Ohio, per se. It's opioid mortality, and
21 it's Ohio and adjacent states.

22 Q. If I refer you to Page 45 of
23 your report, the last line you say that
24 Ohio has the highest rate of fentanyl

1 seizures per capita in the U.S.?

2 A. I did not remember that I
3 said that. Yes, I do say that.

4 Q. Now you remember that?

5 A. Yes.

6 Q. Do you have an opinion as to
7 whether that fact could affect or does
8 affect mortality rates in Ohio separate
9 and apart from shipments?

10 A. Well, I know that obviously
11 the access and use of fentanyl in Ohio is
12 going to contribute to mortality. But it
13 is not separate from shipments. As I
14 said before, it was the increase in
15 shipments that established the demand for
16 opioids, a demand that after 2010 was
17 increasingly met first by heroin and then
18 by fentanyl.

19 Q. So it's your opinion that in
20 the vicinity of 2010, there were these
21 changes, the abuse-deterrent OxyContin
22 and PDMPs and the like, and that that
23 forced a shift of people through gateway
24 from prescription opioid addiction to

1 heroin addiction, right?

2 MR. KO: Object to the form.

3 THE WITNESS: I -- I'm not

4 sure I would use the word

5 "forced." But it induced the

6 shift in -- from -- from

7 prescription opioids to illicit

8 opioids.

9 BY MR. HALLER:

10 Q. So that occurs in your
11 opinion in 2010 or thereabouts. And then
12 fentanyl-driven mortality increases
13 radically several years after that,
14 correct?

15 MR. KO: Object to the form.

16 THE WITNESS: That's

17 correct.

18 BY MR. HALLER:

19 Q. And what drives that
20 increase? It's not the same 2010 shift,
21 is it?

22 A. I believe it is. In fact, I
23 discussed that in the report. I discuss
24 the fact that essentially what happened

1 was because people become addicted to
2 opioids in run up to 2010, when
3 prescription opioids became harder to
4 get, they moved to the heroin.

5 And then when fentanyl
6 became available, it became a much more
7 profitable way for drug dealers to meet
8 that ongoing demand. So drug dealers --
9 it was not an individual demand for
10 fentanyl. Indeed, as I discuss in my
11 reports, individuals don't appear to want
12 fentanyl. They even -- there's even a
13 demand for test strips for fentanyl in
14 their drug supply.

15 But suppliers recognize that
16 this ongoing opioid demand, beginning
17 with prescription opioids, passing
18 through heroin, could be met more cheaply
19 and profitably by starting to introduce
20 fentanyl into the opiate mix.

21 Q. So it's your testimony that
22 the same factors that you claim happened
23 in or around 2010 drove heroin addiction
24 and then had a delayed effect and later

1 drove fentanyl --

2 MR. KO: Object.

3 BY MR. HALLER:

4 Q. -- overdoses; is that
5 correct?

6 MR. KO: Object to the form.

7 THE WITNESS: I think what I
8 would say, I would put it slightly
9 differently. What I would say is
10 it drove heroin addiction and a
11 new, if you will, technology of
12 meeting more cheaply those
13 addicts' needs emerged with
14 fentanyl, especially, available
15 from China.

16 And so there was a shift in
17 the sort of technology of meeting
18 the addicts' needs to a more
19 profitable means for the dealers,
20 which was to introduce fentanyl.

21 BY MR. HALLER:

22 Q. When did prescription opioid
23 overdose deaths peak nationally?

24 A. We can look at Figure 1.8,

1 on Page 38. And it shows the peak at
2 about 2011.

3 Q. And heroin mortality peaked
4 in 2014 or 2015; is that right?

5 A. Yeah, it looks from the
6 graph like about 2015.

7 Q. Do you understand that total
8 opioid-related overdose deaths including
9 for fentanyl and heroin and prescription
10 opioids, have declined in Ohio in 2018
11 over 2017?

12 MR. KO: Object to the form.
13 Objection. Foundation.

14 THE WITNESS: I don't recall
15 whether that's the case.

16 BY MR. HALLER:

17 Q. Do you know whether that's
18 the case in Maine?

19 MR. KO: Same two
20 objections.

21 THE WITNESS: I don't
22 recall.

23 BY MR. HALLER:

24 Q. Do you know if that's the

1 case in any other states?

2 MR. KO: Same two
3 objections.

4 THE WITNESS: No, I don't.

5 BY MR. HALLER:

6 Q. Now, when you use the term
7 "shipments," you're using that as a
8 shorthand, I assume, right?

9 I mean, it's not -- it's not
10 your testimony that, you know, if a drug
11 distributor has a van and drives
12 pharmaceutical supplies including
13 prescription opioids to a pharmacy and
14 unloads it and it goes into a locked room
15 and never leaves that room, that that
16 shipment is somehow driving mortality, or
17 opioid use disorder or anything else,
18 right?

19 MR. KO: Object to the form.

20 THE WITNESS: I don't know
21 about your particular
22 hypothetical, but I will say, as
23 I've described before, we are
24 using shipments as a proxy for

1 opioid use in the county.

2 BY MR. HALLER:

3 Q. Right. It's not the
4 shipment, per se, in and of itself that's
5 driving either opioid use disorder or
6 opioid mortality. It's the combination
7 of, I assume, and tell me if I'm wrong,
8 the shipment then being dispensed by a
9 pharmacist to a patient and that -- it
10 then being consumed in the public, right?

11 MR. KO: Object to the form.

12 THE WITNESS: There are --
13 as we discussed earlier today
14 there's a variety of different
15 modes including diversion and --
16 and other things that can lead to
17 this sort of if you will
18 translation from the production of
19 the opioid to ultimate use by the
20 consumer.

21 I think the proper way to
22 think about it is just to say that
23 we want to measure -- in this
24 analysis, we want to measure

1 opioid use at the county level.
2 Shipments is the best data
3 available at the county level that
4 allows us to proxy for opioid use.

5 BY MR. HALLER:

6 Q. Well, then maybe -- maybe
7 you're viewing this as being overly
8 simplistic on my part. But it's used in
9 the county only if there's something more
10 than the shipment, right?

11 The shipment has to get to
12 the county and then it's -- it's
13 dispensed to patients in the county,
14 correct?

15 MR. KO: Object to the form.

16 THE WITNESS: Once again,
17 the -- the shipment is part of the
18 chain. That chain cannot break in
19 multiple ways. I don't -- can't
20 think offhand where a shipment
21 could directly cause a death
22 without other elements of the
23 chain. But I don't claim to be
24 another expert in all the possible

1 mechanisms that that couldn't
2 happen.

3 But certainly we, I think,
4 typically, you do the shipment as
5 part of a chain of events that
6 leads to the harms that are due to
7 opioids.

8 BY MR. HALLER:

9 Q. Do you have an opinion as to
10 whether some people are more susceptible
11 than others, either because of their
12 brain chemistry or history to addiction?

13 A. I believe that is true, yes.

14 Q. And I take it you don't
15 think that shipments cause that
16 susceptibility, correct?

17 MR. KO: Object to the form.

18 THE WITNESS: I don't think
19 that shipments cause genetic
20 variations across individuals, no.

21 BY MR. HALLER:

22 Q. If you turn to the back of
23 your report where you discuss crime.

24 A. Okay.

1 Q. And I -- I have a similar
2 question to the one I had before.

3 With regard to the analyses
4 that are reflected graphically on
5 Page 79, but also in the underlying
6 analyses themselves, what do you call
7 that, the analysis that you're doing
8 there?

9 A. I'd give the same answer I
10 did before. It's a -- it's a transparent
11 illustration of the causal relationship
12 between shipments and crime. That is a
13 natural compliment to the kind of
14 progression analysis that Dr. Cutler does
15 in his report.

16 Q. And as before, I -- I won't
17 find this analysis, this type of analysis
18 referred to in any textbook, correct?

19 MR. KO: Object to the form.

20 Mischaracterizes --

21 THE WITNESS: Incorrect.

22 MR. KO: -- the witness's
23 previous answer.

24 BY MR. HALLER:

1 Q. Okay. So could you point me
2 to that textbook that would describe this
3 type of an analysis?

4 A. I can't.

5 Q. And is there, apart from a
6 textbook, is there a source that you can
7 point me to where this type of analysis
8 has previously been done to prove
9 causation leading to crime?

10 A. Causation leading to crime?

11 Q. Right.

12 A. No, I cannot point to a
13 source. I can -- as I said I can point
14 to the Evans article, and with time,
15 could find other sources that uses kind
16 of graphical comparison. But I don't
17 recall of a source that does this to
18 establish a relationship between
19 prescription opioids and crime.

20 Q. Or between anything and
21 crime?

22 MR. KO: Object to the form.

23 THE WITNESS: Not to my --
24 not to my recollection.

1 BY MR. HALLER:

2 Q. Can I refer you to Page 43
3 please, in your report.

4 A. Okay.

5 Q. So that page includes
6 Figure 1.10, which reflects, does it not,
7 that for the most part, shipments into
8 Summit were above the national average
9 for this time period, whereas shipments
10 into Cuyahoga were below the national
11 average; is that right?

12 A. Yes, that's correct.

13 Q. Did you do any investigation
14 into why shipments were, per capita, were
15 significantly lower in Cuyahoga than they
16 were in Summit?

17 MR. KO: Object to the form.

18 THE WITNESS: Not that I can
19 recall.

20 BY MR. HALLER:

21 Q. If we turn the page to
22 Figure 1.11, we can see opioid mortality
23 rates in Summit and Cuyahoga in relation
24 to the national average. And at least

1 through 2010 or 2011, the mortality rates
2 in both counties stayed pretty close to
3 the national average; is that right?

4 A. That's correct.

5 Q. Now, if -- if shipments, in
6 your view, drive opioid mortality, how is
7 it that the two counties end up with
8 about the same opioid mortality but there
9 are significantly big differences in the
10 shipments to those two counties?

11 MR. KO: Object to the form.

12 THE WITNESS: Can you
13 express that in terms of the
14 graphs? I don't quite understand
15 what -- what conclusion you're
16 drawing.

17 BY MR. HALLER:

18 Q. Well, on page -- on Page 43,
19 in Figure 1.10 we can see that the
20 shipments into Summit were much higher
21 than the shipments into Cuyahoga, right?

22 A. Yes.

23 Q. But the mortality, as
24 reflected on Figure 1.11, is roughly the

1 same as between the two counties. And I
2 would have thought if shipments, in fact,
3 are driving mortality, that the higher
4 shipments in Summit would have led to
5 higher mortality, but instead, the higher
6 shipments resulted in about the same
7 mortality. So I'm -- I'm asking if you
8 can square that for me.

9 MR. KO: Object to the form.

10 THE WITNESS: Sure. So two
11 answers. One is about the same
12 until 2014 when -- when Summit
13 does get higher.

14 And the second answer is, as
15 I said before, we're trying to use
16 these data to explain the central
17 tendencies that both, as I say, if
18 you do a sort of transparent
19 graphical analysis or regression
20 analysis, there's a clear
21 relationship between shipments in
22 2010 and opioid mortality.

23 That does not mean that that
24 relationship -- that does not mean

1 you cannot find an observation of
2 data or two for which that
3 relationship doesn't appear to
4 hold. You can take any empirical
5 analysis and find a pair of
6 observations where the
7 relationship estimated for the
8 central tendency of the data
9 doesn't hold for that pair of
10 observations.

11 BY MR. HALLER:

12 Q. And here the pair of
13 observations is Cuyahoga and Summit,
14 right?

15 A. That's correct.

16 Q. Now, you've testified -- and
17 I think your report reflects this view,
18 that these various factors that you say
19 happened in or around 2010, in reality
20 those factors didn't all occur in 2010 at
21 a particular point in time; is that
22 right?

23 MR. KO: Object to the form.

24 THE WITNESS: That's

1 correct.

2 BY MR. HALLER:

3 Q. PDMP programs, for example,
4 were instituted by some states many years
5 ago and other states more recently and in
6 some states still don't exist, correct?

7 A. That is correct. Let me
8 clarify. I'm not sure if they don't
9 exist in some states. But the first two
10 parts of your statement are definitely
11 correct.

12 Q. When Mr. Geise was asking
13 you questions, you didn't know when
14 Ohio's PDMP came into effect, correct?

15 MR. KO: Objection. Asked
16 and answered.

17 THE WITNESS: That's
18 correct.

19 BY MR. HALLER:

20 Q. So how is it that these
21 various changes, which were happening
22 over a multi-year period in your view all
23 caused an inflection point precisely in
24 2010?

1 A. My view of this -- of the
2 big picture here is that these changes
3 were happening over time. I -- and my
4 reading on the literature on PDMPs is
5 that the initial ones were relatively
6 weak and the stronger ones came in later
7 towards the 2010 period, that the pill
8 mill crackdown happened after the 2010
9 period.

10 So the way I would view this
11 as the reformulation causing the
12 inflection, but the strength of the
13 inflection and the subsequent strength of
14 the response being driven by the
15 combination of factors that I list in
16 this report.

17 Q. Now, on Page 34 of your
18 report you state that illicit opioid
19 mortality accelerated again after 2013 as
20 drug traffickers started to incorporate
21 fentanyl as a lower cost alternative to
22 heroin.

23 What source do you have for
24 the date of 2013 as the date or the year

1 when drug traffickers started to
2 incorporate fentanyl?

3 A. That's -- that's a reference
4 to my reading of the literature or, quite
5 frankly, this is referring to the
6 literature I didn't specifically read,
7 but that Compass Lexecon read and
8 summarized for me, was the gist, that
9 2013 was the sort of rough timing when
10 fentanyl started really coming in as a
11 substitute for heroin.

12 Q. And is the source for that
13 what's stated here in Footnote 75 or is
14 it something else or you don't know?

15 A. That is one source. I
16 believe it's shown in multiple locations.
17 But that source, as far as I understand,
18 is the source of that, although I did not
19 read that particular article.

20 Q. If I can refer you to Page
21 43. We were there not too long ago.
22 This is maybe similar to one of the
23 questions that I asked, but different.

24 At the bottom of that page,

1 you state that the mortality rate in
2 Cuyahoga County increased by 280 percent,
3 and that in Summit County it increased by
4 362 percent. So I have a similar
5 question, which is, what effort, if any,
6 did you undertake to determine why
7 mortality increased in Summit to a
8 greater extent than it did in Cuyahoga in
9 the very most recent years?

10 MR. KO: Object to the form.

11 THE WITNESS: I did not do a
12 specific analysis of that
13 phenomenon.

14 BY MR. HALLER:

15 Q. If I can refer you to Pages
16 52 and 53 of your report, this is where
17 you examined variability in shipments and
18 determine whether any of that -- you
19 know, the degree to which that
20 variability is explained by certain
21 economic factors, right?

22 A. Economic and demographic
23 factors, yes.

24 Q. And you show that the --

1 that the variation narrows once you
2 control for those factors, but it doesn't
3 narrow by a lot in your opinion, correct?

4 A. That's correct.

5 Q. Okay. And that's reflected
6 in this Figure 1.15, right?

7 A. That's correct.

8 Q. Again, sort of going back to
9 sort of variation on a theme, but where
10 in any textbook can I find this type of
11 an analysis that looks at variation,
12 regresses it against economic and
13 demographic factors, to determine, you
14 know -- at one point in time, right, so
15 this is not over time type of analysis --
16 that that is an accepted methodology?

17 MR. KO: Object to the form.

18 THE WITNESS: That would be
19 a common methodology used in
20 articles. I don't know if it's
21 included or explained in a
22 textbook. Certainly econometric
23 textbooks talk about what we
24 call -- this is a sort of

1 residualized analysis, where
2 you're controlling for other
3 factors and then looking at the
4 behavior of the residual after
5 controlling for those other
6 factors.

7 So this would be -- that
8 would be the general principle. I
9 don't know if the textbooks would
10 express it in this way, but that
11 would be the principle they're
12 looking at here.

13 BY MR. HALLER:

14 Q. And with regard to a
15 residualized analysis, is there any
16 modifier that would describe this type of
17 analysis based on the fact that it's a
18 snapshot at one point in time?

19 MR. KO: Object to the form.

20 THE WITNESS: I guess it
21 would probably be called a
22 cross-sectional residual analysis.
23 Residual, residualized, I'm not
24 sure which term the textbook would

1 use.

2 MR. HALLER: Bless you.

3 BY MR. HALLER:

4 Q. It's your opinion that
5 prescription activity drives shipments to
6 an area, correct?

7 A. It's my opinion that
8 prescription activity, shipments to the
9 area, as we discussed before, are two
10 different proxies for the availability
11 and use of opioids in an area.

12 Q. Look on Page 52 of your
13 report. You say that prescription
14 activity drives shipments to an area,
15 right?

16 A. Where is that?

17 Q. At the top.

18 A. Yes, I do say that.

19 Q. If prescriptions drive
20 shipments, what causes differences in
21 prescription levels?

22 A. Well, differences in
23 prescription levels can be caused by a
24 wide variety of factors, ranging -- first

1 there would be the underlying medical
2 need. Second, there would be different
3 preferences of doctors. Third, there
4 would be the marketing of those -- of the
5 drugs to the doctors, which will affect
6 their use of them. Fourth could be
7 attitudes towards -- towards using those
8 drugs. Fifth could be things like the
9 police environment and the risk of
10 getting caught using these drugs
11 illegally.

12 There's a whole list of
13 factors that would all actually interact.
14 These would not operate separately.
15 Attitudes could be shaped by police --
16 policing patterns and things like that.
17 They would come together to drive
18 shipments to an area.

19 And it's all going to be
20 influenced by -- I'm sorry, to drive
21 prescription activity. And that will all
22 be influenced by the underlying push or
23 marketing towards using these
24 prescriptions that's going to be sort of

1 an underlying factor. It's going to
2 underlie all of that.

3 Q. Well, as between Summit and
4 Cuyahoga, did you do any investigation as
5 to why it's the case that Summit has a
6 higher prescription level of activity
7 than Cuyahoga?

8 A. No, I did not.

9 MR. HALLER: Why don't we
10 take a break, and we'll regroup
11 with our team and see what else
12 needs to be done.

13 THE VIDEOGRAPHER: The
14 time is --

15 MR. KO: Hold on a second.
16 So is there more questioning?

17 MR. HALLER: Yes, I think
18 we're going to regroup --

19 MS. CASTLES: Let's go off
20 the record.

21 MR. HALLER: Yeah, we'll go
22 off the record.

23 THE VIDEOGRAPHER: The time
24 is now 6:17 p.m. We are going off

1 the record.

2 (Short break.)

3 THE VIDEOGRAPHER: The time
4 is 6:20 p.m. We are on the
5 record.

6 - - -

7 EXAMINATION

8 - - -

9 BY MS. UNGER DAVIS:

10 Q. Good afternoon. I'm Kate
11 Unger Davis. We just met off the record.
12 And I represent the Purdue defendants in
13 this matter.

14 I have just a few questions
15 for you. I'm going to try and make it
16 quick, because I realize we've been here
17 going over this.

18 So your measure of shipments
19 includes all opioids, correct?

20 A. It includes all opioids that
21 are recorded in the ARCOS data --

22 Q. Okay.

23 A. -- that -- yes.

24 Q. So does that include

1 immediate release and extended-release
2 opioids?

3 A. I believe that includes both
4 of those.

5 Q. And branded and generic
6 opioids?

7 A. I believe so.

8 Q. And you said earlier that
9 you didn't look at any particular
10 defendant or any particular opioid; is
11 that correct?

12 MR. KO: Objection. Asked
13 and answered.

14 THE WITNESS: This report
15 does not focus on any particular
16 defendant or opioid.

17 BY MS. UNGER DAVIS:

18 Q. And rather, you were looking
19 at shipments of prescription opioid
20 medications in the -- in the aggregate?

21 A. Yes.

22 Q. And you said also that you
23 did not personally look at the ARCOS
24 data; is that correct?

1 MR. KO: Object to the form.

2 THE WITNESS: I did not
3 personally look at the ARCOS data,
4 no.

5 BY MS. UNGER DAVIS:

6 Q. You also said that OxyContin
7 is a major contributor to shipments of
8 opioid shipments. Is that an opinion
9 you're offering here today?

10 A. It's obviously badly worded
11 by me. But the opinion I'd offer is that
12 OxyContin is one of the largest
13 prescription -- has -- has a large market
14 share of -- in the prescription opioid
15 market. So therefore, if shipments are
16 rising, OxyContin would be a major
17 contributor to that.

18 Q. And how did you arrive at
19 that opinion?

20 A. I -- well, if you look at --
21 let's see. If you look at Figure 1.2 on
22 17, I don't break out OxyContin, per se,
23 but I do show oxycodone. And I know that
24 OxyContin has a large market share in

1 that space and that is the largest
2 contributor of the increasing shipments
3 of prescription opioids.

4 Q. And what page are you on?
5 I'm sorry?

6 A. I'm on Page 17.

7 Q. And can you name other forms
8 of oxycodone?

9 A. Not offhand, no.

10 Q. Okay. And this chart that
11 you are citing to here, do you know, the
12 oxycodone, does that include generic and
13 branded?

14 A. I believe it does.

15 Q. Okay. And do you know if
16 that include -- includes immediate
17 release and extended-release?

18 A. I believe it does.

19 Q. Okay. And do you know if
20 OxyContin is an immediate release or an
21 extended-release medication?

22 A. I -- I believe that
23 OxyContin is an extended-release
24 medication.

1 Q. And do you know what
2 percentage of this oxycodone graph is
3 actually OxyContin?

4 MR. KO: Object to the form.

5 THE WITNESS: No, I do not.

6 BY MS. UNGER DAVIS:

7 Q. Okay. And did you undertake
8 to look at that?

9 A. Not as part of my analysis,
10 no.

11 Q. Okay. So when you say that
12 OxyContin is a large part of oxycodone
13 and oxycodone is a large part of total
14 opioid prescriptions, you can't quantify
15 what percentage is actually OxyContin; is
16 that correct?

17 A. I don't in this report, no.

18 Q. Okay. And have you done
19 that work outside of this report?

20 A. I have not.

21 Q. Okay. Have you asked anyone
22 to do that?

23 A. I believe that in the
24 context of other reports that's been

1 looked at, I believe in particular
2 Dr. Rosenthal's report, they've looked at
3 the share of different particular
4 manufacturers.

5 Q. Okay. And are you relying
6 on Dr. Rosenthal's report?

7 A. Not for that particular
8 question.

9 Q. Okay. And we are talking
10 here, we're talking about MME per capita
11 per day; is that correct?

12 A. That's correct.

13 Q. Okay. Do you know how the
14 MME per cap -- or per day -- excuse me.

15 How the MME compares between
16 oxycodone, hydrocodone, fentanyl,
17 morphine, et cetera?

18 A. How the -- I know how the
19 relative weights, the relative MME for a
20 given unit compare. That's shown in --
21 that's using data that's put together by
22 the government. And that is shown in the
23 figure here, Figure 1.6 on Page 35, shows
24 the relative strength in terms of MME of

1 different types of prescription opioids.

2 Q. And have you considered what
3 part of the market share OxyContin has by
4 any other sort of measurement?

5 A. I have not, no.

6 Q. Okay. So you don't know the
7 number of pills that these shipments are,
8 what -- what percentage of those pills
9 are OxyContin pills?

10 MR. KO: Object to the form.

11 THE WITNESS: No, I don't.

12 BY MS. UNGER DAVIS:

13 Q. Okay. And you don't know
14 that on the national level or the state
15 level or the county level?

16 A. No, I don't.

17 Q. Okay. And have you
18 undertaken to look what percentage of the
19 shipments to the bellwether jurisdictions
20 was OxyContin as compared to any other
21 opioid?

22 A. No, I've not.

23 Q. Now, turning to the abuse
24 deterrent formulations, would you agree

1 that studies show that the reformulation
2 of OxyContin was effective in reducing
3 the misuse and abuse of OxyContin?

4 MR. KO: Object to the form.

5 THE WITNESS: That is my
6 understanding of those studies,
7 yes.

8 BY MS. UNGER DAVIS:

9 Q. And would you agree that
10 Evans 2019 which you rely on, shows that
11 as well?

12 A. Yes.

13 Q. And Cicero 2015, which you
14 also rely on, supports that point as
15 well?

16 A. That one I don't recall as
17 well. So give me a moment.

18 Q. Sure.

19 A. We can take the time, I can
20 look at it.

21 Q. If you want to. It's
22 Exhibit 13.

23 A. Exhibit 13.

24 Q. If you prefer I can read to

1 you.

2 A. Yeah, that would be great.

3 Q. Okay.

4 A. Or you could -- I could
5 look -- if you have a copy I could look
6 at.

7 MR. KO: Find the article,
8 John.

9 THE WITNESS: What?

10 BY MS. UNGER DAVIS:

11 Q. That's fine. So the result
12 says, "Reformulated OxyContin was
13 associated with a significant reduction
14 of past month abuse after its
15 introduction."

16 A. I'm sorry, I need to look at
17 it and I can't find my copy. Is there
18 another copy that I can look at?

19 Q. You can look at Cicero 2015.

20 A. You said it's Number 13?

21 Q. That's -- I believe that's
22 correct. Exhibit 13.

23 A. I'm not trying to be
24 difficult. I'm just having a hard time

1 finding it.

2 I'm sorry. To which page
3 are you referring?

4 Q. So the results section it
5 says, the first sentence, "Reformulated
6 OxyContin was associated with a
7 significant reduction of past month abuse
8 after its introduction."

9 A. Yes, I see that.

10 Q. Okay. Do you say -- do you
11 see under objective where it says, "To
12 examine the factors that led to the
13 initial steep decline in OxyContin
14 abuse"?

15 A. Yes, I do.

16 Q. Okay. And then Alpert 2018
17 also noted, "Evidence suggests that
18 OxyContin reformulation reduced
19 nonmedical OxyContin use by as much as
20 40 percent."

21 Did you consider that?

22 A. Where is that in the
23 article?

24 Q. Sure. If you turn to the

1 second page, the second full paragraph
2 down, the last sentence says, "Indeed,
3 time series evidence suggest that the
4 OxyContin reformulation reduced
5 nonmedical OxyContin use by as much as
6 40 percent."

7 A. Yes, I see that.

8 Q. And as your report notes,
9 Purdue was the first to manufacture an
10 abuse-deterrent formulation of a
11 prescription opioid medication, correct?

12 A. That's correct.

13 Q. And I believe you've already
14 testified that you're aware that the FDA
15 encouraged the development of
16 abuse-deterrent formulations?

17 A. Yes.

18 MR. KO: Objection. Asked
19 and answered.

20 BY MS. UNGER DAVIS:

21 Q. And are you aware that Ohio
22 Attorney General Mike DeWine has also
23 supported abuse deterrent formulations?

24 MR. KO: Objection.

1 Foundation.

2 THE WITNESS: No, I'm not.

3 MS. UNGER DAVIS: Mark this.

4 What are we on?

5 (Document marked for

6 identification as Exhibit

7 Gruber-17.)

8 BY MS. UNGER DAVIS:

9 Q. Here you'll see a
10 December 16, 2013, letter to the
11 commissioner of the Food and Drug
12 Administration.

13 Do you see that?

14 A. Yes.

15 Q. And if you turn to the third
16 page.

17 A. Okay.

18 Q. You'll see about halfway
19 down on the left-hand column is the
20 signature of Mike DeWine, Ohio Attorney
21 General?

22 A. Yes, I see that.

23 Q. And the second paragraph
24 says, "The State's Attorney General wants

1 to thank you" -- meaning the commissioner
2 of the FDA -- "for your recent efforts to
3 ensure branded opioid drugs have
4 abuse-deterrent formulations."

5 Did I read that correctly?

6 A. Yes.

7 Q. It goes on to say,
8 "Abuse-deterrent properties is a
9 common-sense improvement that provides
10 yet another important tool in the fight
11 against our nation's prescription drug
12 epidemic."

13 Did I read that correctly?

14 A. Yes.

15 Q. Did you consider this?

16 A. This letter?

17 Q. Mm-hmm.

18 A. No, I did not.

19 Q. And do you believe that Ohio
20 Attorney General Mike DeWine bears some
21 responsibility for the harms you
22 attribute to abuse-deterrent formulations
23 of prescription opioid medications?

24 MR. KO: Object to the form.

1 Objection. Foundation.

2 THE WITNESS: I don't
3 actually attribute harms to
4 abuse-deterrent formulation. I
5 attribute harms to the shift that
6 followed the introduction of
7 abuse-deterrent formulations.

8 BY MS. UNGER DAVIS:

9 Q. So do you support the
10 adoption of abuse-deterrent formulations?

11 MR. KO: Objection.

12 THE WITNESS: I don't
13 really -- I haven't really thought
14 about conjecturing. At the time,
15 I wasn't really aware of that
16 policy, so I don't -- didn't
17 really think about it.

18 BY MS. UNGER DAVIS:

19 Q. Okay. So you don't have an
20 opinion on whether or not abuse-deterrent
21 formulations are a good thing?

22 MR. KO: Object to the form.

23 THE WITNESS: I think that
24 the articles that we've discussed

1 today show that the analysis of
2 abuse-deterrent formulations means
3 it's complicated about whether
4 they were a net -- a good thing or
5 a bad thing.

6 BY MS. UNGER DAVIS:

7 Q. Did you evaluate in your
8 model the State Attorney General's
9 position?

10 MR. KO: Object to the form.
11 Position as to what?

12 THE WITNESS: I don't
13 understand what that means.

14 BY MS. UNGER DAVIS:

15 Q. The State Attorney General's
16 support for abuse-deterrent formulations,
17 did you take that into account in your
18 model?

19 A. No, I did not.

20 Q. So do you support the
21 efforts of the industry to prevent misuse
22 or abuse of prescription opioid
23 medications?

24 MR. KO: Object to the form.

1 THE WITNESS: That's too
2 broad a question.

3 BY MS. UNGER DAVIS:

4 Q. It's not a yes or no?

5 A. No.

6 MR. KO: Same objection.

7 MS. UNGER DAVIS: All right.
8 Shall we re-regroup?

9 MS. CASTLES: Can we go off
10 the record?

11 THE VIDEOGRAPHER: The time
12 is 6:33 p.m. We're off the
13 record.

14 (Short break.)

15 THE VIDEOGRAPHER: The time
16 is 6:43 p.m. We are on the
17 record.

18 - - -

19 EXAMINATION

20 - - -

21 BY MS. RUMSEY:

22 Q. Hello, I'm Allison Rumsey.

23 I represent the Endo parties. I'll
24 speak -- or I'll start again.

1 I'm Allison Rumsey, and I
2 represent Endo. So I know that I'm all
3 that's between you and the door, so I'm
4 going to ask a couple of questions at the
5 end here.

6 Are you familiar in your
7 research -- did you read the Jalal
8 article that came out in September 2018
9 about the opioid epidemic? Are you
10 familiar with that article?

11 A. I don't recall.

12 (Document marked for
13 identification as Exhibit
14 Gruber-18.)

15 BY MS. RUMSEY:

16 Q. Okay. Why don't we
17 introduce this. It's Gruber-18. Is it
18 18?

19 MR. KO: Thank you.

20 BY MS. RUMSEY:

21 Q. So the -- just to jump at
22 the end, the -- in this article, the
23 group of professors -- it's a group from
24 the University of Pittsburgh, and they

1 actually looked at the opioid epidemic
2 from 19 -- or at the epidemics in the
3 United States from 1979 through to the
4 current day.

5 And they concluded here on
6 the first page, if you look under
7 conclusion, "The U.S. drug overdose
8 epidemic has inexorably tracking along an
9 exponential growth curve since at least
10 1979."

11 Have -- in your analysis,
12 did you look back as far as 1979?

13 A. No, we did not.

14 Q. Did you consider other kinds
15 of epidemics?

16 A. We did look -- I do refer in
17 my report, I talk about deaths from a
18 crack epidemic. And at one point, I
19 refer to heroin or OUD rates during this
20 current period to past periods.

21 Q. And what did you conclude
22 about -- where in your article?

23 A. So I looked --

24 Q. Your report.

1 A. -- at -- if you look at
2 Paragraph 8, I says, "The size of other
3 drug crises in U.S. history pale in scope
4 compared to the current opioid crisis.
5 In contrast, the 47,600 opioid-related
6 deaths in 2017, fewer 3,000 individuals
7 died of crack cocaine overdoses at the
8 height of that epidemic. While
9 methamphetamine deaths could indeed rise
10 in the U.S., there are only 5,130 deaths
11 involving methamphetamines in 2017."

12 If you look at Paragraph 21,
13 analysts from RAND estimate that as of
14 2010, roughly 1.5 million people
15 regularly used heroin. In contrast,
16 available studies indicate there were
17 roughly 110,000 opioid addicts in 1967.
18 So it's a historical pattern.

19 Q. Heroin -- heroin addiction
20 is not an entirely new problem in the
21 United States?

22 A. No, it's not, but the
23 magnitude seems much larger.

24 Q. And if you look at the

1 individual drugs in the lines in -- I
2 guess it's still Page 1 of 6. I think
3 I -- if you turn it over.

4 A. Mm-hmm.

5 Q. Diagram 8, you'll see that,
6 in fact, a number of these drugs are
7 increasing over time from 1999. And
8 just, do you see here where the yellow
9 line is an unspecified drug? You see
10 heroin is going up. But also meth is
11 going up exponentially?

12 Does -- do you have an
13 account -- do you have an explanation for
14 why all of those drugs are increasing
15 exponentially in a similar pattern to
16 heroin?

17 MR. KO: Object to the form.

18 THE WITNESS: I have not
19 reviewed this study. A critical
20 component analysis of mortality is
21 what you do in cases where there's
22 overlapping drugs. Where you have
23 meth plus fentanyl for example.

24 I don't know how they handle

1 those cases here. Obviously
2 the -- it turns out the weight of
3 those cases can matter. I don't
4 know how they handle them here.

5 So, yeah, so it's hard for
6 me to draw a conclusion because I
7 don't know how -- how these are
8 data that are relative to what we
9 did in our work.

10 BY MS. RUMSEY:

11 Q. If somebody -- if -- if
12 somebody took fentanyl, meth with
13 fentanyl and they died, would that be an
14 opioid death or would that be some other
15 death?

16 A. That's a good question. So
17 what we did to try to analyze that is to
18 say -- to think about the fact that
19 you've got deaths from opioids plus other
20 drugs. You've got deaths from opioids
21 alone, and deaths from other drugs alone.
22 And if you look at deaths -- if you look
23 at the first two categories, they are
24 going up enormously. Both deaths from

1 opioids alone and deaths from opioids in
2 combination with other drugs. Whereas
3 nonopioid deaths, that is the other drugs
4 without opioids, are pretty flat.

5 So that leads us to believe
6 that that is not a -- it's a judgment
7 call. But our judgment, my judgment of
8 the data is given that when you look at
9 other drugs without opioids, it's pretty
10 flat, that it's really opioids that drive
11 them in these combination deaths.

12 Q. So the -- the Jalal article,
13 if you go to Page 5 of 8, they concluded
14 that the epidemic of drug overdoses in
15 the U.S., it's the same sentence, has
16 been inexorably tracking along an
17 exponential growth curve since at least
18 1979, well before the surge in opioid
19 prescribing in the mid 1990s.

20 And it goes on to say
21 basically that the opioid epidemic is
22 just actually part of a larger epidemic
23 that was heroin in the 1970s, crack in
24 the 1980s, meth in the '90s, prescription

1 drugs -- meth and prescription drug in
2 the '90s, heroin, fentanyl, and they go
3 onto say, in fact, whatever is going to
4 be causing this in the future is -- is
5 probably not even known yet. But the
6 synthetic drugs are now the main source
7 of -- of deaths.

8 A. Yes.

9 MR. KO: Hold on. I don't
10 know if there is a question there.
11 So I will object, first of all,
12 object --

13 BY MS. RUMSEY:

14 Q. So you --

15 MR. KO: Hold on. Let me
16 just -- I appreciate the soliloquy and I
17 appreciate your attempt to summarize the
18 article, but I object to the form.

19 I also object to the extent
20 that you're trying to characterize an
21 article that Mr. Gruber hasn't read.

22 BY MS. RUMSEY:

23 Q. Do you -- do you have a view
24 on how the prescription -- the use of

1 prescription drugs in the '90s fits into
2 the larger drug epidemic that we see in
3 this country?

4 A. I have a view that it is an
5 exception. And that the reason that they
6 draw the conclusion they do is because --
7 now that I've looked at this article, I
8 remember think -- reviewing this article
9 and discussing it. They treat -- they
10 take an exponential form of mortality
11 growth which is not what's done typically
12 in the literature. We look at mortality
13 rates, not log mortality rates, which is
14 what they do. So while it's true
15 exponentially, they are sort of saying
16 that if -- if you go from 10 people dying
17 of heroin to 20 people, that is just the
18 same as going to a million to two
19 million. That is not a proper way to
20 analyze -- in my view, that's not a
21 proper way to analyze the effect of
22 opioids on deaths, and so I don't think
23 this is really a very relevant analysis
24 to the kind of analysis we do in our

1 reports.

2 I also -- I don't know if
3 it's -- if it's true that opioid deaths
4 have fallen off in 2018. But if that's
5 true, that would also be inconsistent
6 with their conclusions.

7 Q. Well -- well, actually you
8 can re-read the article. But I think
9 their conclusions would say that opioids
10 will drop off and something else will
11 replace it.

12 One last question. So just
13 so that we're clear, you consulted -- in
14 preparation for this, you spoke with
15 Cutler, McGuire, and also with Rosenthal?

16 A. I spoke with Rosenthal
17 throughout -- throughout the development
18 of the project. But at the end when
19 we're working on our reports, I was
20 not -- I was not discussing with
21 Rosenthal.

22 Q. Okay. But were you
23 discussing your report then with McGuire
24 and Cutler?

1 MR. KO: I would just give
2 you the same instruction,
3 Dr. Gruber, as I've given before,
4 as to not disclose the contents of
5 any communications that you had
6 with these other experts when
7 counsel was present.

8 THE WITNESS: Yes. I
9 discussed it with Cutler and
10 McGuire.

11 BY MS. RUMSEY:

12 Q. Okay. And did you discuss
13 your report with any other -- any other
14 individuals, other than counsel?

15 A. I also discussed my report
16 with the team from Compass Lexecon that
17 supported me in writing the report.

18 Q. And did you rely on anybody
19 else's reports or work that you haven't
20 mentioned yet here today?

21 A. No, I did not.

22 MS. RUMSEY: Okay. Then I
23 think we're done.

24 MR. KO: Okay. I have a few

1 follow-up questions.

2 MS. RUMSEY: Okay.

3 - - -

4 EXAMINATION

5 - - -

6 BY MR. KO:

7 Q. Dr. Gruber, we're almost
8 done, but like I said, just a few more
9 questions.

10 Earlier today, or just a
11 moment ago, Mr. Haller was asking you
12 some questions about Figures 1.17 and
13 1.18 of your report. Do you recall that?

14 A. Yes, I do.

15 Q. And go ahead and turn to
16 that section. I believe it's on Page 56
17 of your report. It's Figure 17 and
18 Figure 18, 1.18 to be clear, is on
19 Page 59 of your report.

20 Now, Mr. Haller was -- well,
21 first of all, Figure 1.17, to be clear,
22 depicts data from NSDUH and ARCOS,
23 correct?

24 A. Yes, it -- it uses data from

1 NSDUH and ARCOS.

2 Q. Okay. And -- and the NSDUH
3 data as we have discussed before talks
4 about the, among other things, the opioid
5 use disorder rates, correct?

6 A. The NSDUH is used to measure
7 opioid disorder -- opioid use disorder
8 rates.

9 Q. And the -- the table or the
10 Figure 1.18, what are the datasets that
11 are used to show the -- the graph there?

12 A. Well, in -- in both figures,
13 the -- the two samples are divided based
14 on the shipments data.

15 The key difference, and I --
16 I keep forgetting this during the
17 deposition, I'm sorry about that, is that
18 for the NSDUH data, that's only available
19 at the state level.

20 As a result, whereas the
21 mortality data which is depicted in
22 Figure 1.18 is developed at the county
23 level. So the underlying prescription
24 data that's used to divide the samples is

1 the same. But in Figure 1.17 it's
2 dividing them by the top and bottom
3 states. And in Figure 1.18 is divided by
4 the top and bottom counties.

5 Q. Okay. So if -- Mr. Haller,
6 I think, was trying to make some
7 comparisons as to the percentage
8 differences, and in particular he was
9 making some comparisons about a 40 to
10 50 percent range shown in Figure 1.17 and
11 a 300 percent range for the same time
12 period in Figure 1.18. Do you recall
13 that?

14 A. Yes, I do.

15 Q. And is that range that he
16 was attempting to show the discrepancy
17 in, is it an apples-to-apples comparison
18 when you're using different underlying
19 data, and in particular, NSDUH data and
20 NCHS mortality data?

21 MR. HALLER: Objection to
22 form.

23 THE WITNESS: No, it's not
24 an apples-to-apples comparison.

1 And in particular, the
2 variation is larger across
3 counties than across states.
4 States are larger units, so by
5 definition it's going to be a
6 smaller variation from the most
7 intensive -- the states with the
8 most prescriptions to the least
9 prescriptions relative to the
10 counties with the most and the
11 counties with the least.

12 BY MR. KO:

13 Q. Okay. Now, Mr. Haller also
14 asked you questions with respect to
15 Figure 1.8 of your report. Do you recall
16 that?

17 A. Hold on. Yes.

18 Q. And I believe that's on
19 Page 38, to be clear.

20 And he had talked about how
21 prescription opioid mortality rates in
22 particular had peaked in 2010. Do you
23 recall that question and answer?

24 A. Yes, I do.

1 MS. RUMSEY: Object to form.

2 BY MR. KO:

3 Q. Now, I want to make sure
4 that the record is clear as to what is
5 being depicted in this graph.

6 First of all, what is the
7 time period that is measured in this
8 graph?

9 MS. RUMSEY: Object to form.

10 THE WITNESS: From 1999 to
11 2016.

12 BY MR. KO:

13 Q. And during that time period,
14 let's take prescription mortality rates,
15 what is the general trend regarding
16 prescription mortality rates in this
17 graph?

18 MS. RUMSEY: Object to form.

19 THE WITNESS: Prescription
20 mortality rates trended upwards in
21 2010, then begin to trend
22 downwards, but ended at a point
23 well above where they started.

24 BY MR. KO:

1 Q. Okay. And if my math is
2 correct, I believe there's at least a
3 200 percent increase from the end of this
4 graph relative to the beginning of this
5 graph for prescription mortality rates,
6 correct?

7 MR. HALLER: Object to form.

8 MS. CASTLES: Object to
9 form.

10 MS. UNGER DAVIS: Object to
11 form.

12 MS. RUMSEY: Object to form.

13 THE WITNESS: I can't do the
14 math in my head. It's
15 certainly -- it's certainly well
16 over 100 percent. I don't know if
17 it's 200 percent.

18 BY MR. KO:

19 Q. Okay. Now, earlier this
20 afternoon, Mr. Geise spent some time
21 discussing the epidemiological studies
22 and economic literature you cited in your
23 report, and in particular in Section 5 of
24 your report.

1 Do you recall that
2 testimony?

3 A. Yes, I do.

4 Q. And I just want to
5 understand the context in which you have
6 cited these articles. First of all, with
7 regard to the epi studies, I believe
8 that's in Subsection A of Section 5 of
9 your report; is that correct?

10 A. That's correct.

11 Q. And so is it accurate to say
12 that you are using these epi studies to,
13 in the words of your report, to show,
14 "addition evidence that the illicit
15 opioid crisis was the consequence of
16 shipments of prescription opioids"?

17 MR. HALLER: Object to form.

18 MS. CASTLES: Object to
19 form.

20 MS. UNGER DAVIS: Object to
21 form.

22 MS. RUMSEY: Object to form.

23 THE WITNESS: Yes, as I
24 tried to ineloquently describe

1 before when we were discussing it,
2 there -- what you like to do in
3 economic article is to try to make
4 the argument in multiple ways.
5 This was one of the ways in which
6 I was using to show that this
7 channel -- that I was arguing is
8 the channel from prescription
9 opioids to illicit opioids was
10 plausible, and there was a channel
11 supported by the epidemiological
12 literature.

13 BY MR. KO:

14 Q. So the epi studies are used
15 to support your premises that you list in
16 Section 5 of your report, correct?

17 MR. HALLER: Object to form.

18 MS. CASTLES: Object to
19 form.

20 MS. UNGER DAVIS: Object to
21 form.

22 MS. RUMSEY: Object to form.

23 THE WITNESS: Correct.

24 BY MR. KO:

1 Q. And same with respect to the
2 economic literature that you were
3 questioned about in Subsection B.
4 That --

5 MS. RUMSEY: Object to form.

6 MR. KO: Can I finish my
7 question?

8 MS. RUMSEY: I thought you
9 had.

10 BY MR. KO:

11 Q. So the same question I have
12 with respect to Subsection B of your
13 report, and the question is as follows:

14 You cite economic literature
15 to support your point in Section 5 that
16 there is additional evidence that the
17 illicit opioid crisis was the consequence
18 of shipments of prescription opioid,
19 correct?

20 MR. HALLER: Object to form.

21 MS. CASTLES: Object to
22 form.

23 MS. UNGER DAVIS: Object to
24 form.

1 MS. RUMSEY: Object to form.

2 THE WITNESS: Correct. You

3 know, the typical thing we do in

4 running economic analysis, is you

5 make your argument, and then you

6 try to bring additional evidence

7 to bear to support it. And this

8 is a set of -- as the section

9 title indicates, a set of

10 additional evidence to support my

11 conclusion.

12 BY MR. KO:

13 Q. And, now, are there other

14 reasons or evidence that you cite to in

15 your report other than the epi studies

16 and the economic literature that you list

17 here?

18 A. Yes. I also talk about

19 the -- in substance the counterfactual

20 arguments that I made in Section C saying

21 that the trends that I document in

22 Section 4 cannot be explained by factors

23 like economic opportunity or things

24 related to non-opioid mortality.

1 Q. Okay. And these are all
2 reasons or evidence that you cite to in
3 your report that support your primary
4 analysis and opinion regarding the impact
5 of shipments on -- on harms. And in
6 particular, that there is a direct causal
7 link between shipments that occurred
8 before 2010 and the illicit harms that
9 resulted post 2010?

10 MR. HALLER: Object to form.

11 MS. CASTLES: Object to
12 form.

13 MS. UNGER DAVIS: Object to
14 form.

15 MS. RUMSEY: Object to form.

16 THE WITNESS: My conclusion,
17 as you stated, was that there is a
18 causal link between shipments and
19 mortality, and this Section 5, the
20 epi study, economic studies, and
21 these other factors are done in
22 support of that causal conclusion.

23 BY MR. KO:

24 Q. And that causal conclusion,

1 is set forth in Section 4 of your report,
2 correct?

3 A. That's correct.

4 Q. Okay. So is it fair to say
5 that the reasons that you provide in
6 Section 5 of your report are qualitative
7 reasons that support the primary
8 quantitative economic analysis that you
9 performed in Section 4?

10 MR. HALLER: Object to form.

11 MS. CASTLES: Object to
12 form.

13 MS. UNGER DAVIS: Object to
14 form.

15 MS. RUMSEY: Object to form.

16 THE WITNESS: I would say
17 that's true about Section 5A.
18 Section 5B and 5C are also --
19 they're -- well, let me back up.
20 I wouldn't say they're essentially
21 qualitative or quantitative. What
22 I would say is they are Section 4
23 and Section 5C are primary
24 analysis by myself. Sections 5A

1 and B are reviewing other
2 literatures to support those
3 conclusions.

4 BY MR. KO:

5 Q. Just a couple more
6 questions. There have been some
7 questions by various counsel regarding
8 the underlying data that you have
9 reviewed in particular -- or the
10 underlying data that you have relied on,
11 and in particular ARCOS data. Do you
12 recall that questioning?

13 A. Yes.

14 MS. RUMSEY: Object to form.

15 BY MR. KO:

16 Q. Now, is it common for you,
17 in the academic setting or in any of your
18 previous work, to rely on the work of
19 either consultants or research analysts
20 to examine and review the underlying data
21 before it's given to you?

22 MS. RUMSEY: Object to form.

23 THE WITNESS: Yes, that's
24 typically how I'd write an

1 article, especially as I've gotten
2 more senior in the field.

3 Typically I would not
4 actually handle the data. It
5 would be -- someone would handle
6 it under my direction. I'd
7 constantly check in through the
8 process to make sure it's being
9 done correctly, and then an
10 analyst would produce for me the
11 key datasets and summary
12 statistics that I need to use to
13 draw my conclusions.

14 BY MR. KO:

15 Q. And do you know whether or
16 not -- and I appreciate the answer that
17 you've given that it's common to you. Do
18 you know whether or not this is a common
19 practice in the field of --

20 MR. HALLER: Object to form.

21 MS. CASTLES: Object to
22 form.

23 MS. UNGER DAVIS: Object to
24 form.

1 MS. RUMSEY: Object to form.

2 BY MR. KO:

3 Q. -- health economics?

4 A. This is pretty much how any
5 senior health economist would write a
6 paper.

7 Q. Okay. Final question.

8 There were some questions earlier -- or
9 final area of questioning. There were
10 some questions regarding Appendix 1-D of
11 your report earlier today. Do you recall
12 that?

13 A. Yes, I do.

14 Q. And I believe Mr. Geise had
15 questioned you on -- on a variety of --
16 of metrics or variables that you did not
17 consider. Do you recall that line of
18 questioning?

19 A. Yes, I do.

20 MR. HALLER: Object to form.

21 MS. CASTLES: Object to
22 form.

23 MS. RUMSEY: Object to form.

24 BY MR. KO:

1 Q. And why didn't you consider
2 the variables that Mr. Geise had set
3 forth for you?

4 A. Essentially the goal, if you
5 recall the purpose of this analysis it
6 was to try to ask, can factors relate to
7 medical need explain this enormous
8 variation across counties in -- in
9 shipments.

10 So what we did was start
11 with a sensible list of factors that
12 capture medical need, capture the major
13 determinance of it, and what we found was
14 even with a fairly broad list, it was
15 such a small effect that we deemed it
16 unlikely that adding additional variables
17 of the type that Mr. Geise listed would
18 much affect our conclusions.

19 Q. And did you feel that it was
20 ultimately reasonable to rely on the
21 factors that you did set forth in
22 Appendix 1-D to reach the conclusions set
23 forth in your report?

24 MS. CASTLES: Object to

1 form.

2 MS. RUMSEY: Object to form.

3 THE WITNESS: Yes, I did.

4 Whenever you run a regression,
5 there's a choice about what to
6 include and what to exclude. And
7 we felt that this was a
8 comprehensive set of variables
9 which would indicate to us whether
10 underlying variation of medical
11 need was driving the variation in
12 shipments.

13 MR. KO: Okay. That's all I
14 have. Thank you.

15 MR. HALLER: I have a few
16 questions.

17 MR. KO: He's going to ask
18 you some questions, because I
19 asked you some questions.

20 THE WITNESS: Sure.

21 - - -

22 EXAMINATION

23 - - -

24 BY MR. HALLER:

1 Q. Professor Gruber, Mr. Ko
2 brought you back to your Figures 1.17 and
3 1.18. And in the course of those
4 questions, you reminded yourself and us
5 that the groupings in Figure 1.18 are
6 counties and the groupings in Figure 1.17
7 are states, right?

8 A. That's correct.

9 Q. And I think at the end of
10 your -- one of your responses, you said
11 something about you would expect greater
12 variation as between two counties than as
13 you would between two states, correct?

14 A. That's correct.

15 Q. But in Figure 1.18, you are
16 not comparing one county to another,
17 right, it's the top 25 percent of the
18 counties in the country versus the lowest
19 25 percent of the counties in the
20 country. Those are very huge groupings,
21 correct?

22 MR. KO: Object to the form.

23 THE WITNESS: Those are
24 large groupings. But not as large

1 as the groupings in figure --
2 well, they are large in terms of
3 population, but there's also large
4 groupings in Figure 1.17.

5 BY MR. HALLER:

6 Q. Right. And do you have any
7 reason to think in terms of the
8 population covered that the groupings of
9 25 percent of the counties is greater or
10 less are than the grouping of 25 percent
11 of the states?

12 MR. KO: Object to the form.

13 THE WITNESS: I don't
14 understand the question.

15 BY MR. HALLER:

16 Q. Well, you -- I think you
17 were suggesting that you would expect
18 more variation between counties. And my
19 question is, that might be true, the
20 smallest county to the largest county.
21 But we are talking about the 25 percent
22 of the counties in Figure 1.18. And we
23 are talking about 25 percent of the
24 states in Figure 1.17, right?

1 In terms of the population
2 covered by 25 percent of the states
3 versus 25 percent of the counties, do you
4 have any reason to think one is greater
5 or lesser with the others?

6 MR. KO: Object to the form.

7 THE WITNESS: Yes. I would
8 think, since there's more
9 dispersion across counties, then
10 there's dispersion across states.
11 If you take the top 25 percent and
12 the bottom 25 percent of a more
13 dispersed distribution, those two
14 means would be more dispersed and
15 the top 25 percent and bottom
16 25 percent are less dispersed
17 distribution.

18 So what I missed in my
19 earlier answer, and I apologize
20 for this, is that by definition,
21 by comparing state categories to
22 county categories, you are by
23 definition going to get a bigger
24 variation between the most, the

1 counties with the most shipments
2 and the least shipments. Not just
3 a county. But the counties with
4 the most shipments and least
5 shipments will be more in the
6 tails, because that is a more
7 dispersed distribution than is the
8 distribution across states.

9 BY MR. HALLER:

10 Q. In terms of -- you are
11 talking about in terms of shipments, and
12 I'm talking about in terms of the
13 endpoints you're looking at.

14 You are looking at mortality
15 in Figure 1.18, right?

16 A. Mm-hmm.

17 Q. Number of people, right, who
18 suffered an overdose death?

19 A. Right.

20 Q. Those are real people?

21 A. Right.

22 Q. And in Figure 1.17 we are
23 talking about people living in the states
24 who have opioid use disorder --

1 A. Right.

2 Q. -- right?

3 And so my question is, do
4 you -- is it your opinion that the bottom
5 25 percent of the states in terms of
6 people, the 25 percent of the states
7 cover fewer or greater people than
8 25 percent of the counties?

9 A. No, they cover the same
10 number of people.

11 MR. HALLER: Anybody else?
12 So we can conclude.

13 THE VIDEOGRAPHER: The time
14 is 7:08 p.m. This deposition has
15 concluded and we are off the
16 record.

17 (Excused.)

18 (Deposition concluded at
19 approximately 7:08 p.m.)
20
21
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24

1
2 CERTIFICATE
3
4

5 I HEREBY CERTIFY that the
6 witness was duly sworn by me and that the
7 deposition is a true record of the
8 testimony given by the witness.

9 It was requested before
10 completion of the deposition that the
11 witness, JONATHAN GRUBER, Ph.D., have
12 the opportunity to read and sign the
13 deposition transcript.

14
15 

16 MICHELLE L. GRAY,
17 A Registered Professional
18 Reporter, Certified Shorthand
19 Reporter, Certified Realtime
20 Reporter and Notary Public
21 Dated: April 30, 2019
22
23
24

25 (The foregoing certification
26 of this transcript does not apply to any
27 reproduction of the same by any means,
28 unless under the direct control and/or
29 supervision of the certifying reporter.)
30

1 INSTRUCTIONS TO WITNESS

2
3 Please read your deposition
4 over carefully and make any necessary
5 corrections. You should state the reason
6 in the appropriate space on the errata
7 sheet for any corrections that are made.

8 After doing so, please sign
9 the errata sheet and date it.

10 You are signing same subject
11 to the changes you have noted on the
12 errata sheet, which will be attached to
13 your deposition.

14 It is imperative that you
15 return the original errata sheet to the
16 deposing attorney within thirty (30) days
17 of receipt of the deposition transcript
18 by you. If you fail to do so, the
19 deposition transcript may be deemed to be
20 accurate and may be used in court.

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4 PAGE LINE CHANGE

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2 ACKNOWLEDGMENT OF DEPONENT
3

4 I, _____, do
5 hereby certify that I have read the
6 foregoing pages, 1 - 496, and that the
7 same is a correct transcription of the
8 answers given by me to the questions
9 therein propounded, except for the
10 corrections or changes in form or
11 substance, if any, noted in the attached
12 Errata Sheet.
13
14
15

16 _____
JONATHAN GRUBER, Ph.D.

DATE

17
18
19 Subscribed and sworn
to before me this

20 _____ day of _____, 20____.

21 My commission expires: _____
22 _____

23 Notary Public
24

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